RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Where B.F.Goodrich grommet belts have outlasted others 8 to 1

B. F. Goodrich grommet V belts cut costs 20 to 50%

EACH time this machine is started the belts that drive it take a beating. The shock, combined with the heavy pulling load and high speed, caused the first set of V belts used on this drive to fail in only 6 months. Something exceptional was needed, so B. F. Goodrich grommet V belts were installed. That was over 4 years ago, and they're still in use. In fact, the company superintendent says it looks as though this same set of grommet V belts will operate another 10 years. Here's why B. F. Goodrich grommet belts outperform ordinary belts:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. There are no layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced. And grommet V belts stretch less — only ⅓ as much, on an average, as ordinary V belts.

Better grip, less slip — Grommet V belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

For more facts circle 502 on Reply Card

They cost no more — Grommet V belts cut costs because they last longer, increase production because machines keep running with fewer interruptions, reduce maintenance costs because they need less attention, yet they cost not one cent more. Available in C, D, and E sections. But remember, only B. F. Goodrich makes the grommet V belt (U. S. Patent No. 2,233,294), so to get all these savings, call in your local BFG distributor the next time you need V belts, or write *The B.F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.* (Available in Canada)

Grommet V-Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Maintenance Show

"I have not seen any advance notice of the fourth annual Plant Maintenance Show as to the dates or location and would appreciate an Advance Registration Card if they are available at this time." *Forrest Skoog, Plant Engineer, Texas Foundries, Inc.*

Editor's Note: PLANT ENGINEERING has not received the Advance Registration Card as yet for the Plant Maintenance Show and Conference which will be held this year in Cleveland, from January 19th through 22nd. As soon as the cards are received one will be sent to you.

Other readers interested in getting an Advance Registration Card, please indicate this on the postal card in this issue. Additional information on the Show and Conference can be found in the article appearing in this issue.

Personnel Change

R. P. DeVries, chief engineer at Revere Sugar Refining, Charlestown, Massachusetts, recently retired. He is succeeded by **Charles J. Dettling.**

Foundry Safety Records

DECIDED GAINS in steel foundry safety practice were disclosed in final results of the 1952 national safety contest announced by Steel Founders' Society of America.

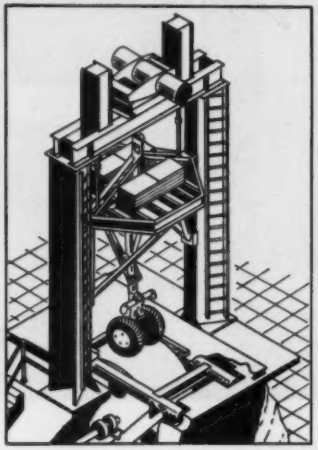
With 134 steel foundries participating on an industry-wide basis, a total of 37 steel foundries qualified for awards. Closely trailing the 15 winners of highest honor awards for accident-free operations during the 3 month competition this year, were 22 others which maintained near-perfect safety records with minimum lost-time accident ratings of 10.0 or less (per 1,000,000 man-hours of exposure) for the period.

Treadmill Tests Landing Gear

RESEARCH SPECIALISTS at Lockheed Aircraft Corp. are building a 230 ton treadmill, which will serve as a make-believe runway for engineers studying how to make airplane landings and takeoffs smoother.

Specifically the wobble stopper will help in elimination of shimmy from aircraft landing gears. Rather than reinforce gears to withstand vibration, the designers plan to do away with it entirely.

The device works like this: airplane nose landing gear units are loaded with as much as 30 tons of weight, then run on a cylindrical drum rotating at speeds simulating takeoff, landing, or taxi operations. Total weight of the supporting tower, base, and rotating drum will be about 230 tons, including gear under test.



Treadmill being built to test landing gears for smoother landings, take-offs

The periphery of the rotating drum can be provided with built-in bumps for reproducing taxi characteristics on rough airstrips. This treadmill technique will permit testing at higher speeds than possible by towing weighted landing gears across runways behind high-speed automobiles.

For Prospective Engineers

THE STUDENT who is thinking of engineering as a profession will find the booklet which is put out by General Motors Corp. very helpful.

In this booklet, entitled "Can I Be an Engineer?" the prospective engineer is told that no matter where he looks he will see the work of engineers. It explains the various engineering fields, civil, mechanical, metallurgical, electrical and chem-

(Continued on page 6)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

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Send for Catalog

—the *new* Armstrong Steam Trap Book gives complete data and prices, tells what size trap to use.

ARMSTRONG STEAM TRAPS

For more facts circle 503 on Reply Card

while the hillbilly CROONED *the plant* **BURNED**

"She'll be comin' raound the mountain . . . ." crooned the Hillbilly on the radio, and the Watchman sat there enjoying it.

Why not? — It was a long, dull weekend. Nobody bothered him on weekends. What if he skipped a round or two?

The Hillbilly drowned out the crackling of the flames in the storeroom. Monday morning there was no factory—just ashes—when the first shift showed up.

The DETEX GUARDSMAN tape-recording Watchclock very likely would have prevented that disaster. The Watchman, knowing that he was being rigidly supervised by a mechanical record of his activities, doubtless would have discovered the flame in its infancy and prevented its spread. Fire officials say that the first 5 minutes in fighting a fire are more important than the next 5 hours.

The GUARDSMAN is just as vigilant on weekends as it is on weekdays. It does away with the need for paying a supervisor overtime to return to the plant on Saturday and Sunday just to change the clock dial.

Don't gamble with your future by ignoring the GUARDSMAN. Today write for free descriptive folder.

DETEX

PATROL ALERT ECO NEWMAN GUARDSMAN

WATCHMENS CLOCKS

DETEX WATCHCLOCK CORPORATION
Dept. PE-12
70 VARICK STREET, NEW YORK 13, N.Y.
Sales and Service in All Principal Cities

For more facts circle 504 on Reply Card

For Prospective Engineers

(Continued from page 4)

ical, and lists the typical jobs the engineer can expect to fill under each category. In addition to this, the booklet offers answers to such questions as: Why should I take engineering? Are there opportunities to get ahead? And, How can I tell whether I should take engineering?

Anyone wishing copies of this booklet should write to Department of Public Relations, General Motors, General Motors Building, 3044 West Grand Blvd., Detroit 2, Michigan.

Chemical "Overcoats" for Seeds

CHEMICAL "overcoats" for tiny grass and legume seeds accounted for increased numbers of hay and pasture plants in 134 farm fields in 28 states during the past summer.

The fields were part of a nationwide experimental program in which farmers cooperated with representatives of the Du Pont Co. to test the chemical treatment of forage crop seeds under actual farm conditions. In each case, the same seed was used throughout the field, with the chemical treatment applied to seeds sown in half the field and the remainder planted without treatment.

Eleven different forage crops were involved in the tests. While differences in stand varied depending on the area where crops were planted, amount of rainfall and soil moisture and cultural practices, the results showed that increased stand in favor of seed treatment was impresssive throughout the country.

The chemical used on the seed is an organic sulfur compound known as Arasan seed disinfectant. It acts as a protectant for the tiny seed and seedling against the attack of disease organisms in the soil or on the seed coat which can produce seed rot, seedling blight, or "damping off," a disease which causes wilting and death of the young plant within a few days after its emergence from the ground.

Growers may either buy the seed disinfectant and treat their seed before planting, or have the seed treated mechanically by local seed firms.

New Plants Going Up

Westinghouse Electric Corp. has built a new television-radio division plant at Metuchen, New Jersey and is completing construction on its electronic tube plant and division headquarters at Elmira, New York . . . **Electric Regulator Corp.** is building a new plant in Norwalk, Connecticut . . . **Wagner Electric Corp.** will completely renovate and modernize the newly acquired buildings adjoining their main plant in St. Louis, Missouri . . . **General Electric Co.** is building a new service shop and warehouse in Philadelphia to serve the industrial needs of Philadelphia and Delaware River Valley regions . . . **Carbide and Carbon Chemicals Co.** is building a new plant in Los Angeles which will produce polyethylene . . . **Lion Oil Co.** plans to build a new chemical plant near New Orleans . . . **Bakelite Co.** has built a new plant at Marietta, Ohio, which will be devoted to the production of phenol.

'ROUND ABOUT

Award Presented to Compressed Air and Gas Institute

ONE OF THE nation's highest honors ecognizing the value of trade association services was awarded to the Compressed Air and Gas Institute—the trade association of manufacturers of industrial air and gas compressors and compressed-air-powered tools and rock drills used by industry.

The honor referred to is the Award of Merit presented to the Institute in the 1952 ATAE Awards for Distinguished Service sponsored by the American Trade Association Executives of Washington, D. C.

In the words of the citation, the Institute was presented the award "for its excellent services to its industry and especially for its education program centered on the schools of engineering throughout the United States and on the trade and technical press."

New Test for Mine Machines

TESTS TO determine a definite basis for advising manufacturers how to avoid unsatisfactory design of explosion-proof electrical parts for mining machinery have been described in a report by the Bureau of Mines.

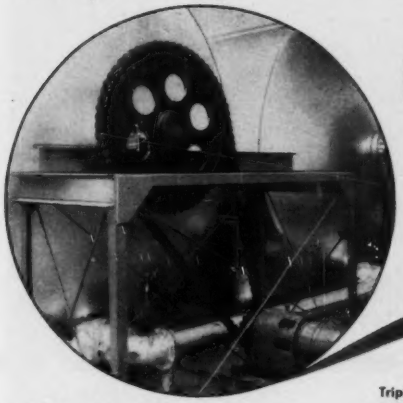
Routine tests had disclosed a phenomenon called pressure piling, a build-up of unusually high explosion pressures inside the parts being tested.

The new method of testing enables the Bureau experts to advise manufacturers on design improvement when electrical parts submitted for testing are subject to this pressure piling.

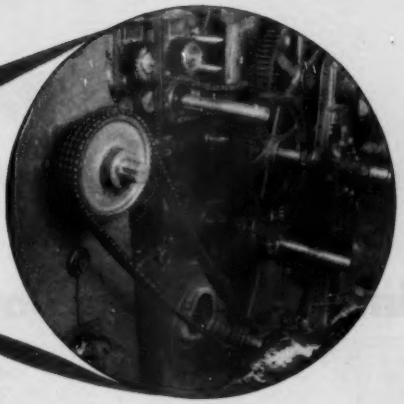
A free copy of the Report of Investigation 4904, "A Study to Determine Factors Causing Pressure-Piling in Test Explosion Proof Enclosures" can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pennsylvania.

In your plant, too

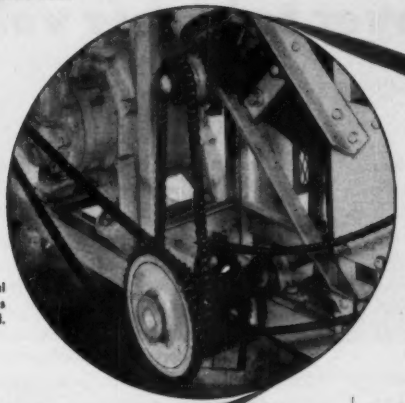
there are many jobs DIAMOND ROLLER CHAINS can do most effectively



Agitator drive 5-ft. center distances. Exact slow speed of agitator assured. (Guard removed to show No. 478 Diamond Roller Chain).

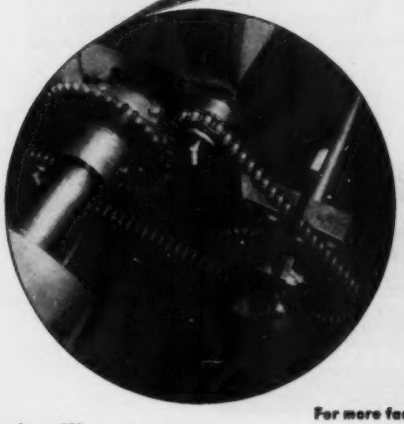


Triple strand chain from motor with another shaft to shaft drive above.



Power source to several shafts at speeds selected as required.

Plant drive in wire mill—driven shaft above is rotated in opposite direction to driving shaft (below).



• For high speed drives from motors, drives from shaft to shaft or one shaft to several others, Diamond Roller Chains provide ideal operation. They are non-slipping, highly efficient (98-99%) and insure reliable top output for many, many years of service.

You will find many applications in your plant where Diamond Roller Chains can serve you. Catalog 709 gives basic chain and sprocket data—copy on request.

DIAMOND CHAIN COMPANY, Inc.
Where High Quality is Tradition
Dept. 614, 402 Kentucky Avenue
Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

Shot-Peening Since 1944

As a matter of course recognizing the value of forging action for increasing strength of steel without adding weight, Diamond long ago experimented with shot-peening. The first of a battery of production shot-peening machines was installed in 1944.

DIAMOND ROLLER CHAINS

For more facts circle 505 on Reply Card

Modern Power Centers

simplify change-over to higher voltage!

Section by section change-over of their plant from 220 to 440 volts was the deciding factor when a large Midwest steel fabricator installed Westinghouse Dry-Type Power Centers. But there were other considerations behind the move.

In the first place, operations had been growing steadily for the past six years, and plans called for further expansion. The old substations, having grown like Topsy, were trouble spots.

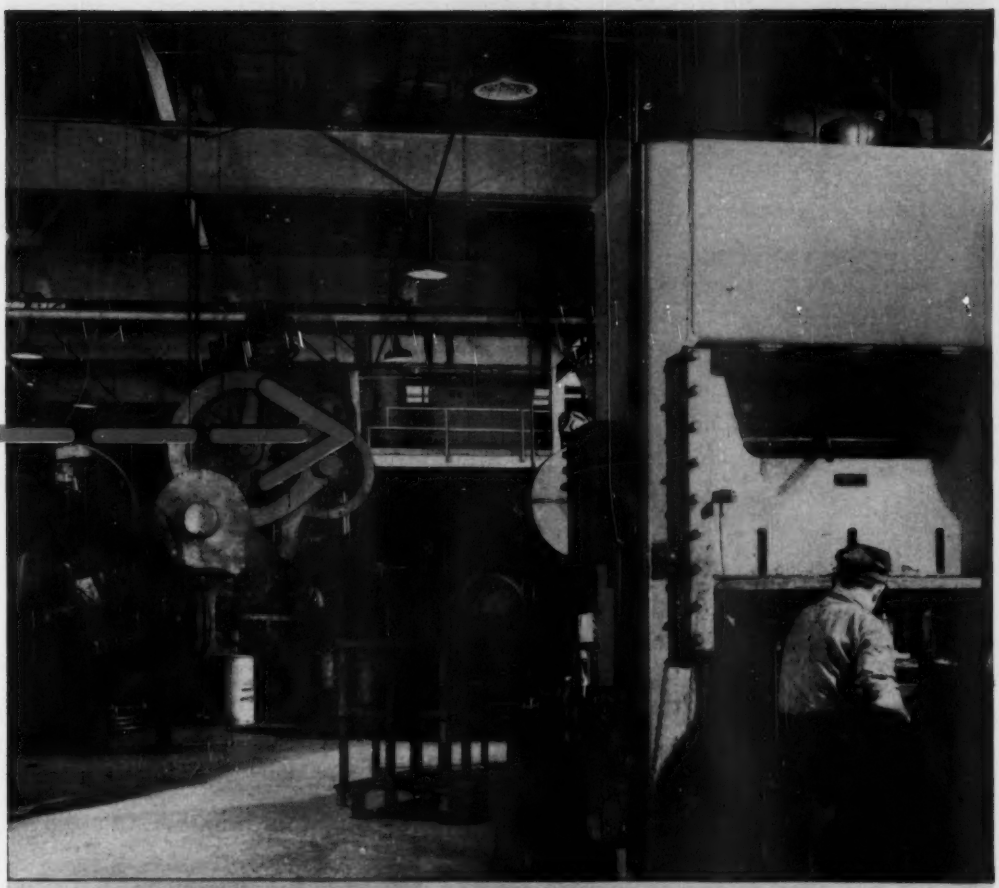
They chose Westinghouse Dry-Type Power Centers because the lightweight, compact units could be installed on raised platforms within the plant, close to the loads they serve. This eliminates the necessity for vaults, catch basins and flues which might impede the flow of work. Shorter secondary leads resulted in a copper saving that covered a good share of the installation cost. Shorter secondaries, too, reduced line losses, improved regulation.

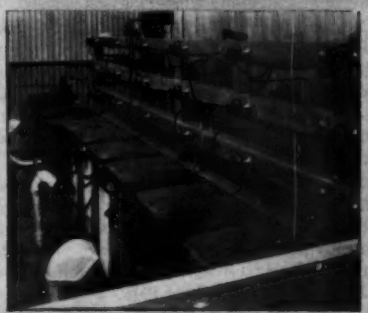
Installation of separate power centers, each serving its own area, made the change-over easy, without interrupting production in other sections. And the flexibility of the new power centers gives greater freedom for future expansion.

Check your own distribution system. You, too, may find excessive losses, poor regulation and outmoded equipment adding hidden operating costs. Your Westinghouse representative will be glad to show how you can make modern power centers pay. Call today, or write for booklet B-4428, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70636

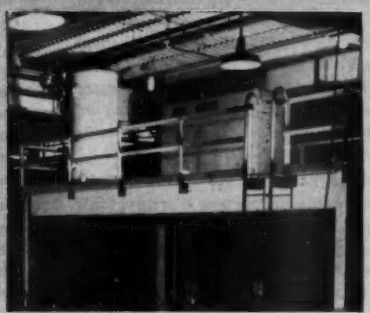
YOU CAN BE SURE... IF IT'S Westinghouse

POWER CENTERS



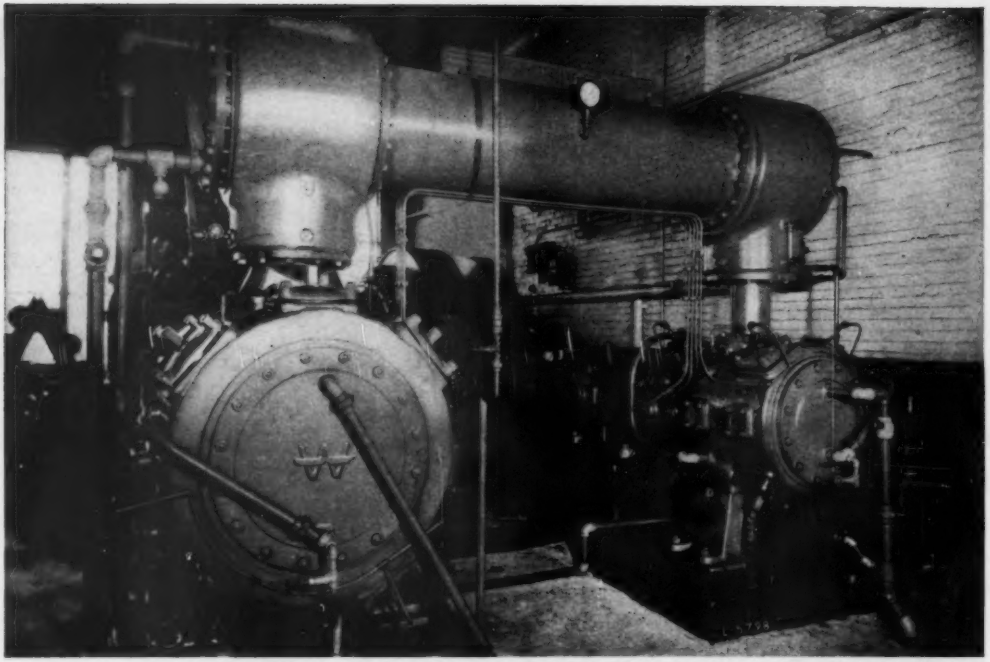


One of the outdoor substations which "just grew" as the load expanded, until they became costly, inflexible and inefficient. Modern power centers replaced these; eliminated their problems.



Westinghouse Dry-Type Power Centers, located on raised platforms close to the load they serve, provide maintenance-free dependability and economy, with flexibility for future expansion.

For more facts circle 506 on Reply Card



WORTHINGTON DC-3 HORIZONTAL AIR COMPRESSOR—One of three compressors that supply air for blowing, grinding, air hoist, spraying, as well as for general foundry and machine-shop applications.

High-efficiency operation doesn't "just happen"!

There are important reasons why this Worthington compressor assures an economical, uninterrupted supply of air

How can an industrial plant be sure the compressors that make up its air supply are efficient—that they will provide all the air needed *when* it's needed at lowest possible cost? Many companies have made sure by selecting Worthington. And one of the biggest reasons they're getting maximum efficiency out of their installation is Worthington's Five Step Variable Capacity Control. Here's why:

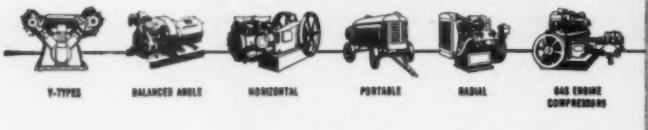
WORTHINGTON'S 5-STEP VARIABLE CAPACITY CONTROL

This unique Worthington control uses Worthington's by-pass principle of unloading so that suction valves are held open during partial-load periods, and cool air or gas is passed at suction pressure in and out of cylinders without compression. *The compressor works no harder than is necessary to meet the load demand.*

The advantages of this Worthington control are many. *Power is saved* at partial load conditions because unloading losses are reduced. *Operating temperatures are lowered* due to the cooling effect of by-pass air. *Carbon deposits are greatly reduced*, so valve trouble is virtually eliminated. *Lubrication is improved* so that cylinder wear is less.

Worthington—long in the compressor business—is constantly working to put even greater efficiency into these sturdy units. By specifying Worthington you automatically specify *maximum efficiency*. Write for Bulletin L-675-B1B to *Worthington Corporation, Compressor Division, Buffalo 5, New York.*

K.2.3



WORTHINGTON
Compressors

No Other Compressor Will Outperform a Worthington

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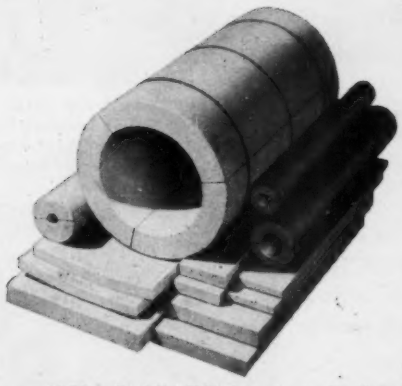
Does Your Present Heat Insulation Have All These Advantages?

Kaylo Heat Insulation is a hydrous calcium silicate — a revolutionary heat-saving material — outstanding both in performance and ease of application.



KAYLO PIPE INSULATION is made to Simplified Dimensional Standards of thicknesses and diameters for snug nesting, when necessary.

1. **LOW "K" FACTOR**—Billions of sub-microscopic air spaces which compose the structure of Kaylo Heat Insulation give it exceptional insulating value.
2. **TEMPERATURE RANGE UP TO 1200° F.**—Kaylo Heat Insulation eliminates the need for combination coverings in nearly all operating conditions.
3. **LONG SERVICE LIFE**—Kaylo Heat Insulation remains dimensionally stable, strong and efficient over the years—although exposed to temperatures up to 1200°F.
4. **INSOLUBILITY IN WATER**—Even when saturated, Kaylo Heat Insulation retains about 85% of its strength. It returns to its original strength after drying.
5. **HIGH STRENGTH**—Breakage of Kaylo Heat Insulation is almost negligible in shipping and installation—workmen can walk on insulated equipment without causing breakage.
6. **LIGHT WEIGHT**—Since Kaylo Heat Insulation weighs only 11 pounds per cubic foot, it is exceptionally easy to handle and apply.
7. **WIDE RANGE OF SIZES AND SHAPES**—Kaylo Heat Insulation's unmatched selection of sizes and shapes reduces the number of pieces required per job.
8. **EASE OF CUTTING AND FITTING**—Ordinary tools of the trade are used to install Kaylo Heat Insulation. The material is non-irritating to the skin and non-toxic.

For complete details on all of the advantages of Kaylo Heat Insulation, write Dept. N-308, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

See our CATALOG in SWEET'S FILE

KAYLO® ... first in calcium silicate

...pioneered by OWENS-ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • CHICAGO • HOUSTON • NEW YORK • PITTSBURGH • ST. LOUIS

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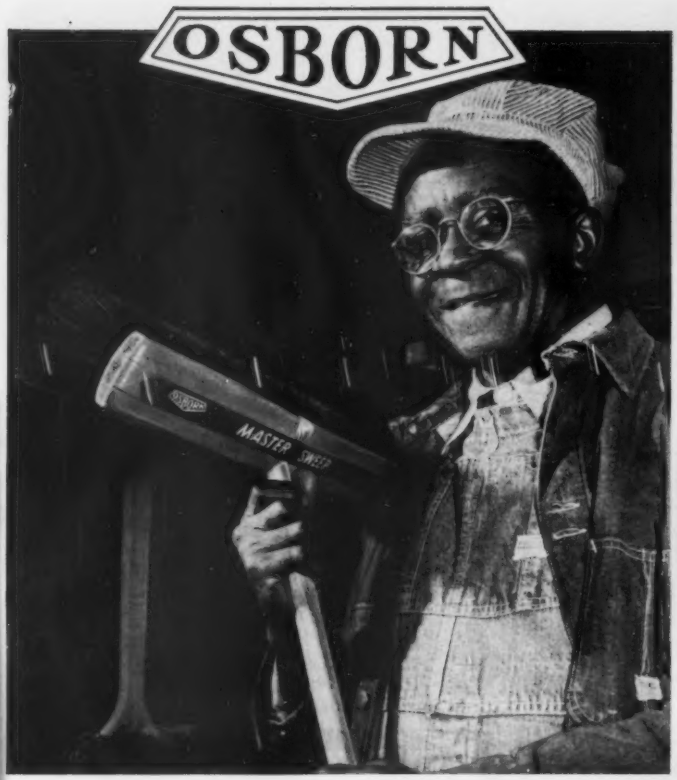

Want to cut down on inventory?

Get on the BRAND *Wagon!* Buy leading BRANDS of routine industrial supplies from your trusted INDUSTRIAL DISTRIBUTOR. His large stock is as handy as your phone. He enables you to cut your inventory and purchasing red tape, and assures you top-quality, nationally-accepted brands.

For all your needs in industrial brushes specify OSBORN . . . the leading BRAND since 1892. "Mass Purchase" OSBORN Brushes automatically from your INDUSTRIAL DISTRIBUTOR on the same order as for other industrial supplies. *The Osborn Manufacturing Company, Dept. 901, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

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YOU'RE SURE to cut inventory and save delivery time when you order OSBORN brushes from your INDUSTRIAL DISTRIBUTOR. He carries a large stock to supply you with the right types of brushes promptly . . . paint brushes, maintenance brushes and power brushes.

YOU'RE SURE to get top quality in OSBORN brushes because their workmanship and materials are backed by 60 years of OSBORN service to Industry.

YOU'RE SURE to save money when you "Mass Purchase" your Osborn brushes along with other industrial supplies from your INDUSTRIAL DISTRIBUTOR. You cut red tape and save.

Better gear protection
when you need it! ✻

—GULF E. P. LUBRICANTS

With Gulf E.P. Lubricants you get extra protection against gear troubles when production demands call for a speed-up of equipment or when unusually heavy tooth loads are developed. They are specially compounded to prevent metal-to-metal contact and help protect against pitting, spalling, and excessive wear.

For specific recommendations for your equipment, call in a Gulf Sales Engineer today. Write, wire or phone your nearest Gulf Office.

Gulf Oil Corporation · Gulf Refining Company
Pittsburgh 30, Pa.

GULF INDUSTRIAL LUBRICATION

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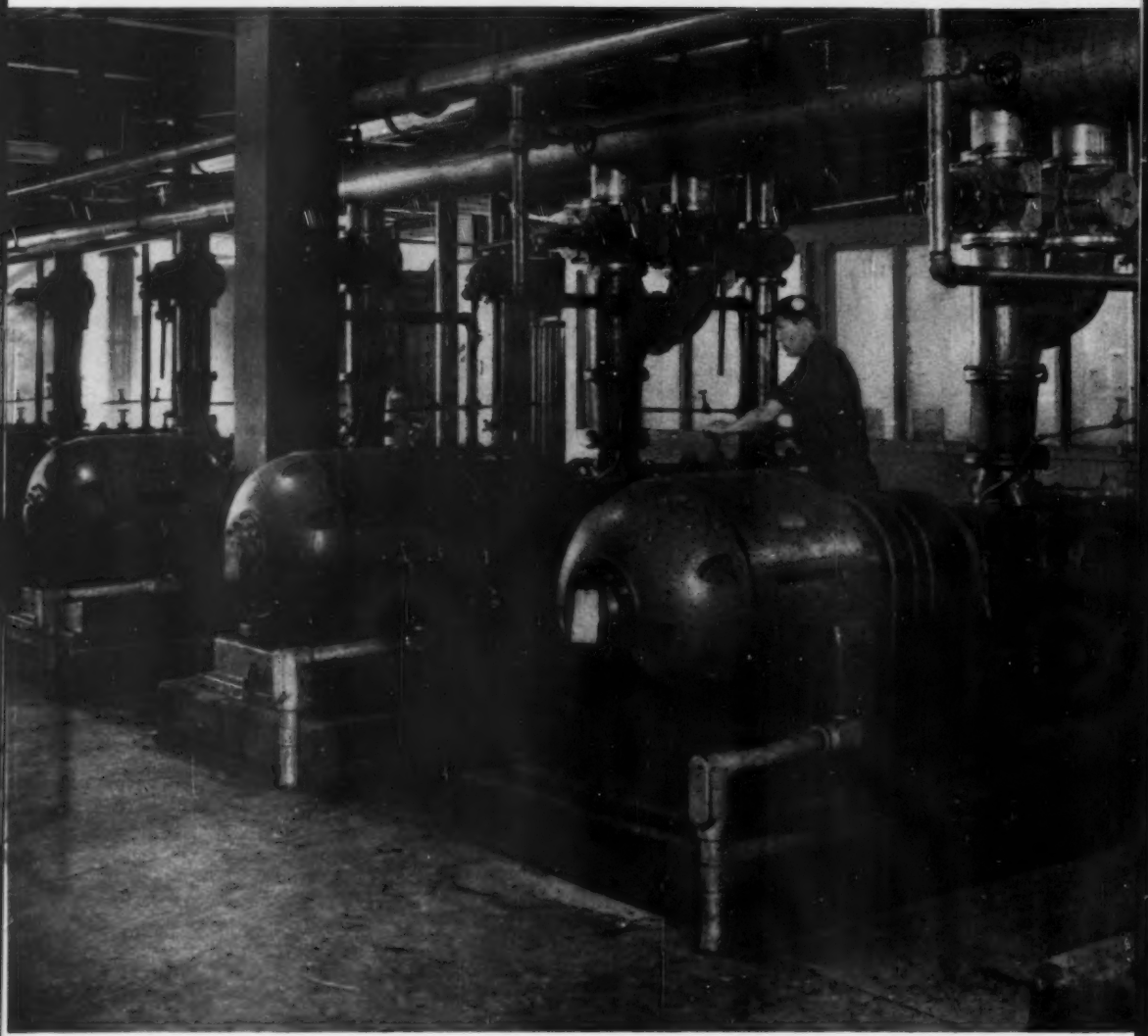
INDUSTRY'S FIRST CHOICE



MASONITE CORP. is among the many big industrial users that prefer Tri-Clad motors for the hard jobs. In fact, 85% of the motors in Masonite's huge West Coast plant are G-E motors. Shown above is part of a bank of 200-hp Tri-Clad motors which drive refiners that brush out the exploded wood chips used in making Masonite boards.

GENERAL ELECTRIC

FOR THE HARD JOBS . . .

TRI/CLAD MOTORS

REG. U.S. PAT. OFF.

More than 10,000,000 horsepower of G-E Tri-Clad motors are now serving American industry. This is ample evidence that Tri-Clad motors are industry's first choice for the hard jobs—jobs where uninterrupted production is a must.

Here, for example, are reports from four more industries where G-E Tri-Clad motors are providing superior performance—with minimum maintenance—regardless of today's increasing production demands.

A MOTOR FOR EVERY NEED

In the Tri-Clad motor line, you have the widest selection of standard motors available today: ratings up to 2000 hp; all types of enclosures; gear motors, brake motors, and adjustable-speed drives—plus many other mechanical and electrical modifications to meet your requirements.

ENGINEERING HELP AVAILABLE

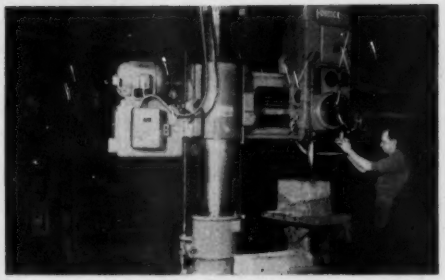
To get top performance from your machines, and to prevent costly shutdowns, G-E engineering specialists stand ready to help you plan your motor applications. And the most complete sales and service network in the motor industry assures you prompt attention to your motor problems.

PROMPT DELIVERY

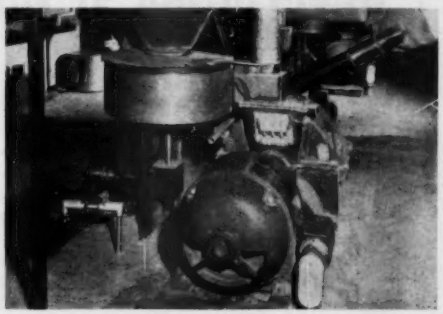
You can get standard G-E Tri-Clad motors right out of stock from G-E shipping points throughout the country. Contact your nearest G-E Sales Office or authorized G-E agent or distributor. *General Electric Co., Schenectady 5, N. Y.*

*Reg. trademark of General Electric Co.

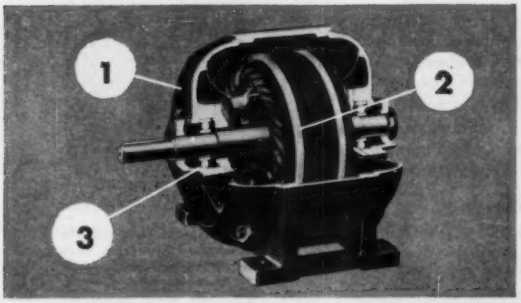
752-15



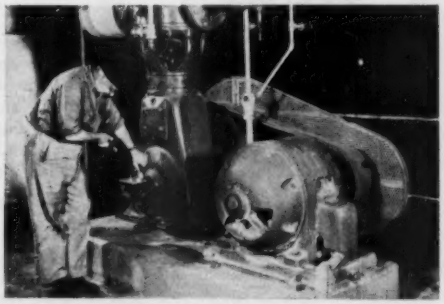
BELL AIRCRAFT CO. uses Tri-Clad motors throughout its plant. The Tri-Clad motor on this heavy radial drill has operated continuously for many years. Plant personnel can't remember a single interruption due to Tri-Clad motor failure!



HERSHEY CHOCOLATE CO. relies on Tri-Clad motors for hard jobs where shutdowns would be extremely costly. This Tri-Clad motor drives a cocoa mill—in continuous operation.



YOU GET TRIPLE PROTECTION with every Tri-Clad motor against .... 1*physical damage*, with rigid corrosion and blow-resistant cast-iron frame; 2*electrical breakdown*, with G-E Formex* wire which resists oil, heat, moisture, abrasion; 3*wear and tear*, with *completely* enclosed bearings that last longer because they can be relubricated if necessary.



AMERICAN CRYSTAL SUGAR CO. reports complete satisfaction with G-E Tri-Clad motors on hard jobs. This Tri-Clad motor provides snappy starting ability needed by the compressor which supplies air to operating equipment throughout the plant, at Moorhead, Minn.

For more facts circle 511 on Reply Card

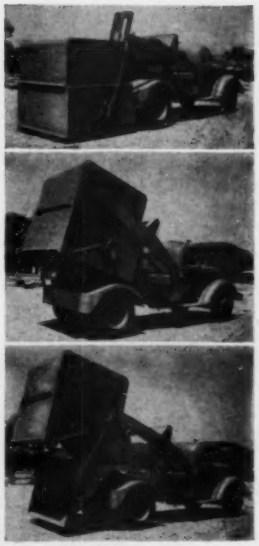
One DEMPSTER-DUMPSTER Serves Scores of Containers . . All Designs . . . All Sizes . .

Handling Materials of Almost Every Description at the Lowest Possible Cost!

One Dempster-Dumpster mounted on one of your trucks serves any required number of big detachable Dempster-Dumpster Containers spotted at convenient materials accumulation points inside and outside your buildings. The capacity of these containers range up to four times greater than the average dump truck body. They are built in a wide variety of designs best suited to the materials handled—be they solid, liquid or dust . . . trash or rubbish . . . bulky light or heavy. The truck-mounted Dempster-Dumpster, with only one man, the driver, picks up one pre-loaded container after another, hauls it to destination where materials are dumped or load set down intact. The Dempster-Dumpster may handle raw materials on one haul, liquids on another, trash and rubbish on another, etc. It's like having one truck with 15, 25, 65 or 100 different bodies.

This is the *Dempster-Dumpster System*—the modern method of bulk materials handling. It is saving thousands of dollars annually for hundreds of plants in every type of industry because it: Eliminates 3 to 5 conventional trucks and crews—reducing cost of truck equipment and operation accordingly. . . Eliminates standing idle time of trucks and crews. . . Eliminates re-handling of materials. . . Increases efficiency, sanitation and good housekeeping.

The *Dempster-Dumpster System* is, without question, the most efficient method of materials handling by truck ever devised! More efficient and lower cost materials handling in your plant may be simply a matter of getting the minds of your engineers and ours together. Write us now. The *Dempster-Dumpster System* is manufactured exclusively by Dempster Brothers, Inc.



WHEN A CONTAINER is full, the Dempster-Dumpster picks it up, hauls it to destination and dumps the materials or sets the load down intact. These three simple operations, shown above, are hydraulically controlled by driver in truck cab.

DEMPSTER BROTHERS - 1122 Shea Building - Knoxville 17, Tennessee

For more facts circle 512 on Reply Card

"Tycol Acylkup keeps bearings running cool... does not emulsify with water"

That's right! Tycol Acylkup Grease withstands heavy unit pressures . . . resists emulsification with water. It is easily applied by grease gun or central system.

Further, Tycol Acylkup Grease contains a high grade paraffin base cylinder oil that steps up bearing efficiency and assures increased bearing life. Protection against wear is long-lasting.

Your nearest Tide Water Associated Office will be glad to give you complete information. Call or wire today.

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TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE · NEW YORK 4, N. Y.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

For more facts circle 513 on Reply Card

SLY

PIONEERS AND LEADERS IN

DUST CONTROL

WE CAN SAVE YOU MONEY BY COLLECTING YOUR DUST

Are you one of those who is still just *enduring* dust? If you are in dust, why not let a trained and experienced Sly engineer suggest a solution?

In *your particular industry* we have numerous operating installations. All of them are *saving* money for their owners–in cleaner plants, cleaner products, better personnel relations. Some of them are even *making* money by recovering valuable products.

With thousands of installations throughout the past 50 years, we have a wealth of experience in all industries. It is an exceptional background of value to anyone with a dust problem.

Yet — Sly costs *no more* (sometimes *less.)* May we send Bulletin 98 and discuss your dust problem with you?

THE W. W. SLY MANUFACTURING CO.

4600 Train Avenue • Cleveland 2, Ohio

New York • Chicago • Philadelphia • Syracuse
Detroit • Buffalo • Cincinnati • St. Louis • Minneapolis • Birmingham • Los Angeles • Toronto

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BACKTALK ABOUT PAST ISSUES

Information on Its Way

PLANT ENGINEERING:

"May we please have additional information on the 'Flame Plating' process as discussed in the October, 1952 issue of PLANT ENGINEERING, starting on page 88.

"I wish there was more time available to carefully study the excellent articles and advertisements in your journal." *W. M. Payne, Chief Engineer, Speer Resistor Div., Speer Carbon Co.*

Leading or Trailing?

PLANT ENGINEERING:

"I would like to bring to your attention the lower picture, Fig. 3, on page 95 of the September issue in the article 'Fire Protection at Convair.' It states that 'Probes are generally applied to the air intakes of the engines. These are on the trailing edge of the wing.'

"I may be wrong but I believe this should read, 'these are on the leading edge of the wing.'

"I enjoyed reading this article on fire protection very much as it is along my line which is safety." *John F. Devney, Rochester, New York.*

Question on Storage Tanks

PLANT ENGINEERING:

"We would like to address the following questions to John Snedden, author of the article 'Acid Handling System Is Designed for Maximum Safety' which appears in the September, 1952 issue of PLANT ENGINEERING, on page 71.

"The questions are:

"1. Is the 10,000 gallon acid storage tank carbon steel?

"2. If it is carbon steel, what is the life of the tank? The repeated water washings must have some effect on tank life.

"3. If the tank is not carbon steel then what is its composition?

"Thank you for your assistance." *J. J. Brosky, Acid Superintendent, American Cyanamid Co.*

Author's Reply

"PLANT ENGINEERING magazine informs me of your interest in the acid handling article and of your three questions. I will try to answer them for you.

"1 & 3. Is the 10,000 gal acid storage tank carbon steel? No. It is a very low carbon content mild steel, ½ in. thick.

"2. Life of tanks. We expect 20 years plus life from the 10,000 gal tank. Note: it is washed only when sludge collects on the bottom or approximately every 12 months. The 2,000 gal tank is now 10 years old and there is no apparent corrosion in that time. The 500 gal pressure tank is washed every 6 months, because of a collection of crystals in the bottom of the tank. This is caused by the frequency of adding air and some condensate does collect and causes some corrosion and crystal deposits on the bottom. However, in 3 years we do not have any pitting and expect the tank to last 8 to 10 years more.

"We flame normalize all welds in the tank to reduce steel stresses to a minimum which reduces corrosion at the stress areas. The waste acid storage tanks are lead lined and they are washed every 60 days or less depending on the amount of sludge that accumulates. The article states storage tank but it is meant to mean waste storage tank.

"I hope this answers your questions and I think we have a good system, but if you have any suggestions for improvement we would be glad to hear from you as chemical equipment is a very serious problem in our plant." *J. T. Snedden, Chief Plant Engineer, Norris Thermador Corp.*

Keeps Magazine Copies Intact

PLANT ENGINEERING:

"Will you please mail me tear sheets covering the articles on refrigeration appearing in the September and October issues of PLANT ENGINEERING.

"We receive your publication regularly and keep all copies intact and on file. I would like the articles on refrigeration for my personal use and would appreciate your sending me tear sheets of these articles." *Lewis L. Moore, Stationary Engineer, New York Central Railroad.*

On Isotopes in Industry

PLANT ENGINEERING:

"The enclosed letter refers to an article in your October 1952 issue relating to use of radioactive isotopes for industrial purposes. Can you mail a tear sheet of this article to Mr. Cunane, St. Cuthbert's Paper Works, Wells, Somerset, England, who is having trouble with inspectors who insist on making an 'exploratory incision' in the lining of digesters, even though there is no evidence of leakage or corrosion.

"I am sure that Mr. Cunane will appreciate the assistance which this reference will give him, and any other references on the subject of non-destructive inspection which may occur to your staff." *L. E. Hill, Plant Engineer, Pulp Division, Everett Mill, Weyerhaeuser Timber Co.*

Mr. Hill's Letter to Mr. Cunane

Dear Mr. Cunane:

"It is a coincidence that just yesterday evening I ran across an article in the October issue of Plant Engineering which contained a reference to the problem that confronts you, and today receive your letter of the tenth of October. The article refers to digesters at the Anglo-Canadian Pulp and Paper Mills,

PITT CHEM Coatings really lick corrosion!

THERE'S hardly a structure or piece of equipment in your plant that won't serve you *better* and *longer* if it's protected with Pitt Chem Tar Base Coatings. No other material does such a complete job of protection at so little cost.

These tough, durable coatings will withstand years of exposure to a wide variety of atmospheric and chemical conditions, above or below ground. They're easy to apply, economical to use and provide a strong, adhesive film up to 10 times as thick as ordinary paints per coat.

Pitt Chem Coatings give you better protection because they're made by a *basic* producer and *quality-controlled* from coal to finished coatings. *If you have a corrosion problem, write or call for a Pitt Chem Coating Specialist today.* He'll be glad to make recommendations without cost or obligation.

PITT CHEM 101
A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102
A thin, high gloss maintenance coating for steel and concrete surfaces.

PITT CHEM 103
A heavy duty coating for metal exposed to corrosive vapors, dilute acids and alkalis.

PITT CHEM 104
A fast drying, high gloss coating for equipment handling potable water.

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PITTSBURGH COKE & CHEMICAL CO.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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LESS LIFTING TIME . . .
MORE FOR PRODUCTION

Want greater output and lower costs? You get both with the 'Budgit' Electric Hoist! This powerful hoist speeds lifting — gives workers extra time to produce more. Women and older men — now helping turn out defense and civilian goods — praise its easy, safe, one-hand operation. And, the 'Budgit' works all day for pennies.

The portable 'Budgit' is a hang-up, plug-in hoist — ready for service as soon as unpacked. No extras to buy. No installation costs. Capacities: 250 to 4,000 lbs. A.C. and D.C. models. Priced from $119. Get all the facts. Send for Bulletin 391.

A 'BUDGIT' I-BEAM TROLLEY makes any hoist more useful. Tough steel construction. Ball-bearings in wheels. Adjustable to fit several I-Beam sizes. Capacities: 500 to 4,000 lbs. Prices from $13.50. Write for Bulletin 390.

'Budgit' ®
ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

For more facts circle 516 on Reply Card

Quebec City, Canada, which were known to have areas of corrosion. The mill did not want to remove the entire lining. According to the article, the shell was mapped with a 'gamma-gage' which revealed the precise location of corrosion and thereby reduced the area which was opened for repair.

"I have written the publishers of this magazine requesting that they forward tear sheets of this article to you. It may be additional material in your discussion with the pressure vessel inspectors."
— L. E. Hill.

Info on Production Control

PLANT ENGINEERING:

"Here I am again with another cry for help. You folks have helped me out with articles in Motion Analysis, Plant Layout and Micro Motion and now comes still another in industrial engineering, namely Production Control.

"I was wondering if you folks would mind sending me as many articles as you'd care to on this subject. I have only one more subject to go and I'll probably call on you for help there, too." *Oscar H. Hunt, Chicago, Illinois.*

Cheesecloth for Safety Glass

PLANT ENGINEERING:

"In the October, 1952, issue of PLANT ENGINEERING, the 'Backtalk' section has several inquiries about the article 'Safety Is Sprayed on Glass Panes,' which appeared in the August, 1952, issue.

"The writer has had much experience with this material. It is a clear liquid about the consistency of light honey, and is evidently a member of the big plastic family.

"During World War II, I was employed as custodian engineer by the Board of Education of a large eastern city. The Board of Education was very anxious to protect the lives of thousands of school pupils in case of an air raid. They furnished the custodians of the schools with instructions on how to apply this coating to the window glass. A first coat was to be put on the glass upright and cross pieces with a brush. Then, a piece of cheesecloth large enough to cover the entire half sash was pressed on. After it dried, another coat was brushed on the entire sash, and the cheesecloth pressed into the corners, then trimmed neatly to the side of the sash. The purpose of the cheesecloth was to prevent pieces of glass from flying about in case of a bombing attack.

"Yes, it did prevent shattering and the glass from flying about endangering people passing underneath on the sidewalks as well as those in classrooms, and there was quite a saving in replacement of glass. It also gave a large degree of protection from flying glass broken with baseballs and other flying missiles.

"However, its disadvantages far outweighed its advantages. It cut down the light entering the rooms from outdoors. It also was hard to clean. The dust adhered to it and worst of all, it was inflammable, especially with the cheesecloth in it. I put a match to a piece which had been pulled from a window. It burned freely. For this reason alone I believe it should not be used.

"What is needed instead of glass is some clear, flexible material that will not break or shatter and will be non-inflammable, and it should be arranged to be replaced with strips and screws, not putty." *James W. Blake, New York.*

Editor's Note: The inflammability of plastic coatings was also brought out in Ralph Smith's letter, which appeared in the "Backtalk" section of the October issue, page 18, under the title "On Glass Pane Coating." Wire glass and plastic materials that will not break, shatter or burn are possible solutions to this problem.

Radiographic Inspection

PLANT ENGINEERING:

"In the 'News from the Plants' section of your October, 1952 issue, we were most pleased to note an article and photograph on radiographic inspection at Schutte and Koerting Co.

"It was a double pleasure to find that on page 87 of the same issue, another photograph and descriptive material on testing procedures at the SK plant was incorporated in a feature article on the industrial application of isotopes.

"In each case, the editorial treatment was excellent and we sincerely appreciate your interest in our client's products and plant operations. Many thanks for a fine job." *Gordon S. Thomas, Account Executive, Harris D. McKinney, Inc.*

Oops! Blank Pages!

PLANT ENGINEERING:

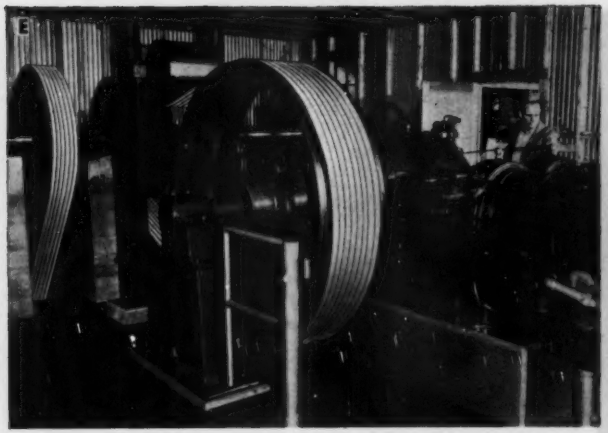
"We attach our copy of the May, 1952 issue of PLANT ENGINEERING. We want to call your attention, particularly to the editorial material appearing on pages 69, 72, 73, 76, 77, 80, 81, 84, 85, 88, 89, etc., which were of great interest here.

"Seriously, we'd like a new copy since there are some incomplete articles of interest to members of our staff." *Stanley D. Brown, Advertising Manager, Dresser Manufacturing Div.*

Editor's Note: Thank you for calling our attention to the bad copy you received of the May issue of PLANT ENGINEERING. Please don't think that this is our new scheme for filling the editorial pages. Once in a while we find material which will fill in the blank pages.

Seriously, we are sorry this happened and are sending you another copy—with those interesting editorial pages included this time. Hope you will find the editorial matter twice as valuable because of the prolonged suspense.

BACK TALK



An extremely compact layout is made possible by the use of these Gates Vulco Rope Drives at the Bivins, Texas, plant of the Breckenridge Gasoline Company. The drives connect an engine with a line shaft driving cooling water and still circulation pumps.

Why a V-Belt with Concave Sides Wears Longer...

—Just try this yourself!

Pick up *any* V-Belt and bend it as if it were going around a pulley. As it bends, grip its side between your fingers and thumb. Here is what you will feel—*every time.*

If the V-Belt has *straight sides,* you feel those sides *bulge out.* This forces the sides of the belt to press *unevenly* against the V-Pulley and you naturally get *concentrated* wear along the bulge —as shown in figure 1-A, below at right.

Now, try this same test with the belt that is built with CONCAVE SIDES—the Gates Vulco Rope!

You find that the CONCAVE SIDES fill out and become perfectly straight. The sides press *evenly* against the V-Pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer* belt *life* and *lower* belt *costs* for you.

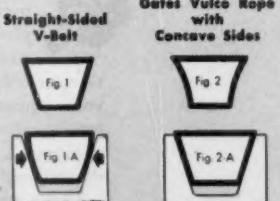
The CONCAVE SIDES of Gates Vulco Ropes (U. S. Patent No. 1813698) clearly give you (1) Less wear, (2) More pulley contact, (3) More sure power transmitted when needed!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-5211

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in the Sheave-Groove. Sides Press Unevenly Against the V-Pulley, Causing Extra Wear at Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in Sheave-Groove. No Side-bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

V-Belts — Hose
Molded Rubber Goods
for Industry
World's Largest Maker
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Don't Bargain-Shop for Service . . .

A part that doesn't fit or function right is poor tonic for your electrical apparatus. That's why Replacement parts can become expensive headaches. They may *replace,* temporarily . . . but they won't *renew* your equipment. Good service economy, rather, calls for a Renewal Part—precision engineered, and designed specifically for the original apparatus.

That's why Westinghouse backs *all* new equipment with a full line of Genuine Renewal Parts. They are precision built—on the same machines that turn out parts for original apparatus. They contain the latest materials and improvements, developed by a multi-million dollar Westinghouse research program. You benefit by getting a *better* part—often better than the one designed for the original equipment.

Westinghouse stocks parts in 31 Renewal Parts Warehouses over the country. This network speeds deliveries . . . helps you with inventory control . . . makes it easy for you to carry frequently used parts.

Renewal Parts, however, is only one phase of the complete Maintenance Service offered by Westinghouse. It also maintains 36 Repair Plants, where all kinds of electrical apparatus is repaired . . . and 46 Field Service Offices to make inspections, adjustments and on-the-spot repairs for equip-

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

There's a difference between replacement and renewal parts!

ment that cannot be moved easily.

These services are backed by factory-tested methods, factory-approved materials, factory-trained specialists. They provide the finest in *service protection* . . . the best in *service economy.* Your proof is in the performance of the finished job.

For more information, write today for a free copy of Westinghouse Maintenance booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pennsylvania. J-95157

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YOU CAN BE **SURE**... IF IT'S

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COMPLETE MAINTENANCE SERVICE

SHOP REPAIR FIELD SERVICE

GENUINE RENEWAL PARTS

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Panel discussions on how casters help reduce the **"Reducible 30%"***

MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

"Floating-Hub" outstanding engineering contribution to improved materials-handling

"Floating-Hub", an exclusive Bassick development, brings a practical, successful principle of built-in shock absorption to wheel construction, applying mechanical resiliency between rim and axle.

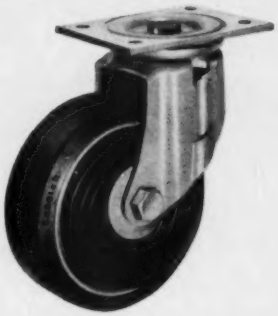
9 Ways "Floating-Hub" smooths and simplifies materials-handling

On trucks and portable equipment "Floating-Hub" (1) absorbs shock, (2) dampens vibration, (3) eliminates bouncing action, (4) rides over obstacles, (5) rolls easier, (6) reduces noise, (7) protects loads, (8) protects floors, (9) reduces truck maintenance by lengthening the life of the truck and caster or wheel equipped with it.

PATENTED CONSTRUCTION DIFFERS FROM ORDINARY SPRING MOUNTINGS

Unlike the usual spring-action device that merely bounces the load over a bump, Bassick's unique "Floating-Hub" snubs the bounce. It rides with the punch, backs away with the blow and at the same time starts its climb. It keeps all wheels in contact with the floor.

Thus, it is entirely different in principle and action from ordinary spring mountings.



WIDE RANGE OF SIZES AND TYPES

Bassick's "Floating-Hub" is available in many sizes (from 6 to 16 in.) and many types (the one shown is No. S-8096R-2 . . . a high quality, double ball race caster with wheels for loads from 500 to 1000 lbs. per caster).

"Floating-Hub" running gear can double the efficiency and life of trailer trucks.

Jet engine assembly line typical of thousands of successful installations

The ability of Bassick patented "Floating-Hub" shock absorption to protect and ease the movement of many kinds of delicate parts and products has been proved by thousands of applications – from jet engines to highly-finished auto bumpers, ceramic products, glass and china ware, loose loads of small parts.

"Floating-Hub" makes trucks and portable equipment as easy-riding as a fine automobile.

Full details available upon request

Bassick's "Floating-Hub" costs only slightly more than ordinary casters. Write for Catalog 124A. There is a local industrial distributor in your vicinity who can supply you with Bassick Casters and Wheels for every need. Factory engineering assistance readily available. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS · MAKING CASTERS DO MORE

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ADJUSTABLE PIPE HANGERS AND SUPPORTS

for every piping requirement

NO. 4 OF A SERIES SHOWING THE GRINNELL LINE

BRACKETS, HOOKS, CLAMPS for attachment to walls, columns and beams

Light Welded Steel Bracket
fig. 194
max. load: 750 lb.

Medium Welded Steel Bracket
fig. 195, max. load: 1500 lb.
heavy welded steel bracket
fig. 199, max. load: 3000 lb.

Side Beam Bracket
fig. 202
load: 150 to 2300 lb.

Side Column Bracket
fig. 203
load: 150 to 390 lb.

Cast Iron Bracket
fig. 223
load: 610 lb.

Cantilever Bracket
fig. 221
with angle iron ext.
fig. 222

Single Hook
fig. 168
½ to 3 IPS

One Hole Clamp
fig. 126
¾ to 4 IPS

FLANGES, CLIPS, HOOKS for attachment to the ceiling

Adj. Swinging Hanger Flange
fig. 155, for ⅜ to ⅞ in. rod
flange only
fig. 156, for ⅜ to 12 in. pipe

Swivel Hanger Flange
fig. 154
for ⅜ to ⅞ in. rod

Pipe Hanger Flange
fig. 153
for ⅜ to ⅞ in. rod

Ceiling Flange
fig. 128
for ⅛ to ⅜ IPS

Adj. Clip Base
fig. 116
for ⅜ to 2 in. pipe
⅜ in. rod size

Wrought Clip, Long
fig. 263
short: fig. 262
½ to 4 in. pipe

Tin Clip
fig. 231
¼ to 2 in.

U Hook
fig. 205
¾ to 8 in. pipe

Call Your Local Grinnell Distributor or write for Hanger Catalog.

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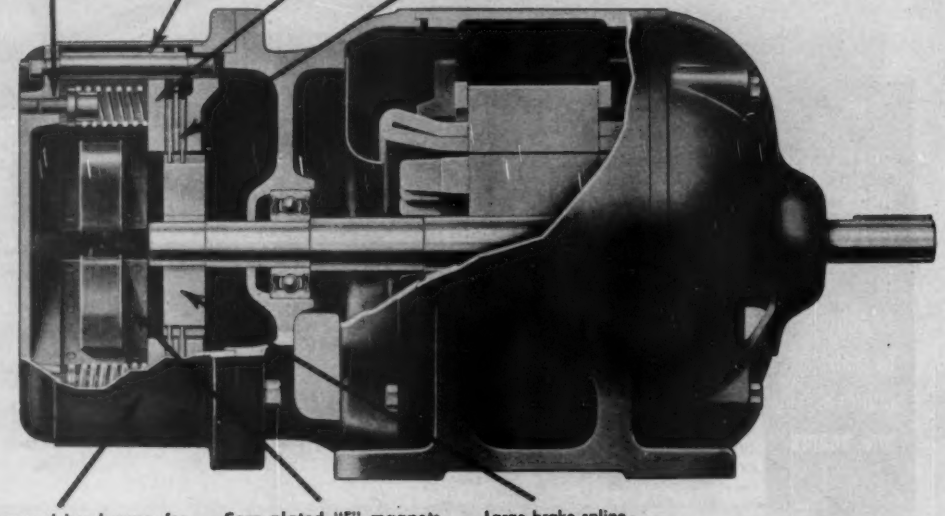
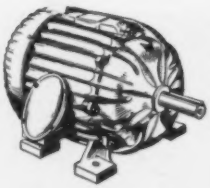
Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

For more facts circle 520 on Reply Card

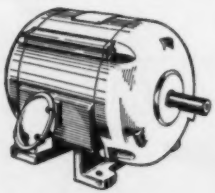
Here's a


Oversize brake studs absorb torque.
Magnet armature plate.
Readily accessible torque adjusting screws.
All-metal brake disc.
Wrap-around band cover, for totally-enclosed protection and easy removal.
Core plated "E" magnets. Readily accessible. Location keeps heat away from motor.
Large brake spline with many teeth.

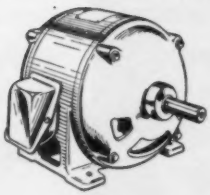
Other ELLIOTT C-W motors for special and general use . . .



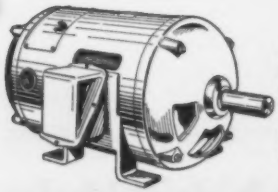
TYPE CFC
Squirrel cage, "Sealed Power," Totally-Enclosed, Fan-cooled



TYPE BE
Squirrel cage, Totally-Enclosed, Non-Ventilated



TYPE BA
Squirrel cage, open-drip-proof (protected)



TYPE BW
Wound rotor, Open-drip-proof (protected)

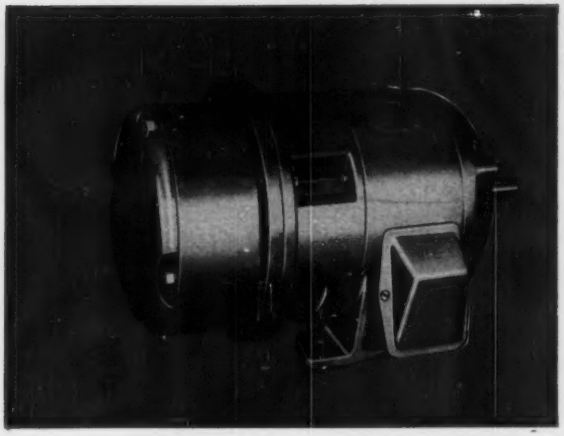
ELLIOTT COMPANY

brake that can take it!

The Elliott CROCKER-WHEELER BRAKE MOTOR

QUICK STOPS AND STARTS are taken in every day stride by this rugged brake motor. Its all-metal *bonded* brake linings dissipate heat faster, wear longer and are immune to dampness, cold and other "brake killers." In performance, the powerful magnetic braking action is instantaneous—and sure.

Moreover, the Elliott C-W brake is tops in compactness and adaptability. It can be mounted on double shaft extension NEMA standard D flange or C face motors without the need of mounting brackets or adapters. Teamed with an efficient Elliott C-W motor (protected or totally-enclosed types), it's a combination that's hard to match.



The Elliott C-W Brake-Motor. Note the simple, wrap-around cover on the brake to give totally-enclosed protection.

SEND FOR THIS BULLETIN

It gives you all the details of construction and applications. Ask for BRAKE MOTOR BULLETIN SL-610-1 and address your request to Elliott Co., Dept. PE, Jeannette, Pa.

ELLIOTT C-W motors range from 1 to 200 hp. Large ELLIOTT motors and generators are built by the RIDGWAY DIVISION in Ridgway, Pa.

CW-23

For more facts circle 521 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Dated Blueprint Stickers

OBSOLETE BLUEPRINTS became the target at Convair's San Diego, Calif., plant as Quality Control continued a campaign emphasizing care and caution as a key to quality workmanship. This includes a carefully planned system for keeping blueprint revisions current.

Stickers are used on blueprints to keep them up-to-date and avoid errors

Each blueprint has a sticker on which is stamped a date. After that date the blueprint becomes "old" and out-of-date. Under this system, the blueprint is recalled at this time and revised if necessary and sometimes reissued with a new void date. The success of this system depends on the people who use it.

The manager of the quality control department pointed out that use of an out-dated print can easily mean an incorrect installation that requires removal and replacement, an expensive process. *From Convairiety, published by Consolidated Vultee Aircraft Corporation.*

A Challenge to Rust

RUST is so commonplace that most of us accept it with hardly a murmur. We expect almost anything made of iron or steel and many other metals to corrode in time, unless special precautions are taken. So we as a nation spend billions annually to prevent the oxygen in the air from combining with metals to form rust.

Losses from corrosion and rust, and efforts to control it, cost the nation over $5 billions annually. How to reduce this loss has plagued man ever since he discovered the art of metallurgy.

But now a new development in corrosion control, a development so helpful and unlike present methods that it deserves to be called revolutionary, is at hand. While no cure-all, VPI is being heralded by industry and the military service as a real milestone in rust prevention.

Picture, if you will, a small steel part, such as a gear, wrapped in a sheet of paper coated with the vapor phase inhibitor. You can't see the coated side of the paper because it is inside the package, next to the gear, but the vapor phase inhibitor on it slowly vaporizes and diffuses all around the part, between the cogs and down the center hole. Oxygen present when the gear was wrapped is in this manner effectively neutralized.

The wrapping might not be air tight, but even so protection will be good for several months at the very least. And if a barrier paper (made waterproof by laminates such as asphalt, aluminum foil, wax or polyethylene) is used to make the package air tight, protection may be good as long as 15 yr.

This rust preventive material is being used today to protect such a variety of things as small machine parts, rifles, airplane engines, wire, tools, tiny watch parts and huge diesel engine crankshafts. Not only does it afford greater protection than older methods of rust prevention, but it reduces costs and is more convenient. *From an article by Warren Easley in Monsanto Magazine, published by Monsanto Chemical Co., St. Louis, Missouri.*

Heating System Gets Steam from Hammers or High Pressure Line—Automatically

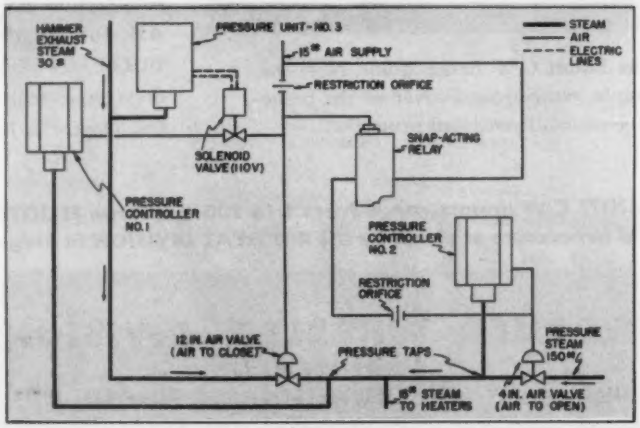
EXHAUST STEAM from drop hammers is used for plant heating at the Ford Motor Co. plant in Canton, Ohio. This takes place during daily production. However, when the plant is closed for the week-end or for a holiday, there is no steam available from the drop hammers.

A switchover to get steam for heating purposes must be made when the hammers are shut down. If the switchover were a manual proposition, which it might very well be, it would be entirely possible that someone might forget to make the switchover, and the plant would not have heat.

As a solution to this problem an automatic system was devised. This takes care of the changeover when the steam hammers are shut down and when they are started up again.

During a regular working day, the pneumatic pressure controller marked No. 1 in the figure, together

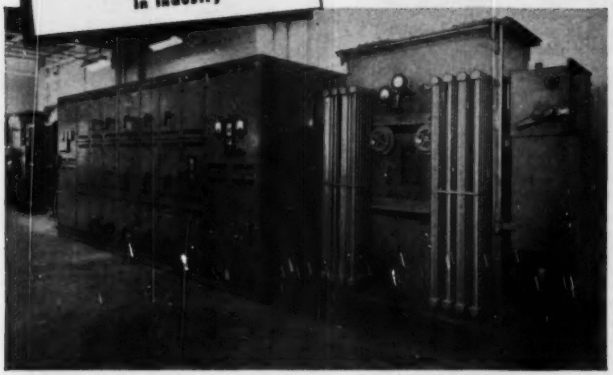
(Continued on page 30)



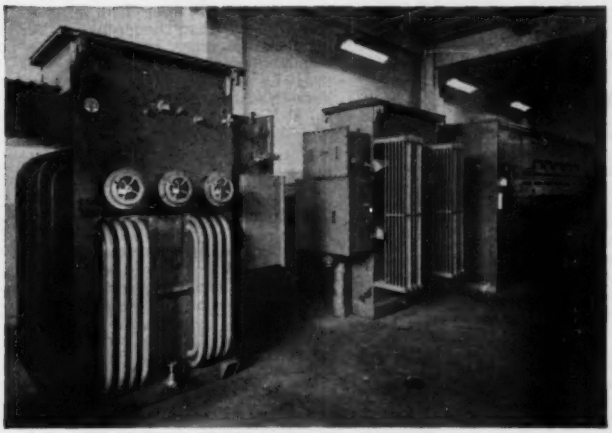
This pneumatic-electric control system handles the steam supply switchover for plant heating purpose. Exhaust steam from the drop hammers is fed to heaters

Wagner
TRANSFORMERS
... the choice of leaders in industry

Wagner Unit Substation Transformers serve American Tobacco



One of the two double-ended unit substations equipped with 750 kva non-inflammable liquid filled Wagner transformers.



One of the two single-ended unit substations in this plant. All transformers are 13800 to 240 volts, 3 phase, 60 cycle.

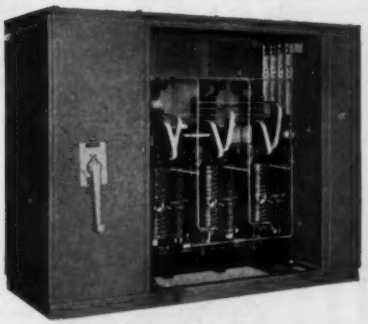
Two double-ended and two single-ended unit substations furnish power for all operations at Louisville plant...

Seven Wagner Unit Substation Transformers are used in the load-center power distribution system in the American Tobacco Company plant at Louisville, Kentucky.

The system is formed of two identical installations—each consisting of a double-ended unit substation equipped with two Wagner 750 kva Noflamol transformers, and a single-ended unit substation with a Wagner 500 kva Noflamol transformer. Another 500 kva Wagner transformer is installed in the boiler room of the plant.

This installation furnishes power for lighting and for all operations, including the humidity control that is so important in the manufacture of cigarettes.

Wagner Unit Substation Transformers are carefully designed to meet your distribution requirements. Oil-filled and non-inflammable liquid filled (Noflamol) transformers are available with various types of entrances and controls for the high-voltage circuits, and with proper throats on the secondary side to connect to any make of switchgear.



Dry-Type Indoor Transformers

Wagner three-phase dry-type load-center transformers are built in ratings through 2000 kva in the 15-kv class and below. Transformer and incoming line section are housed in compact factory-matched enclosures that are connected to matching secondary switchgear to form a closely coupled unit substation that affords ready accessibility. Bulletins TU-56 and TU-13 give full information. Write for your copies.

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6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T52-10

For more facts circle 522 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

with the 12 in. air-to-close diaphragm motor valve acts as a pressure reducer. That's because they reduce the 30 psi exhaust steam from the hammers to 15 psi for the heater lines.

When the steam hammers are shut down, the exhaust steam pressure drops to zero. The mercury switch type pressure unit (No. 3), tapped into the exhaust steam line immediately senses this pressure drop and the mercury switch tilts. The solenoid valve closes in the supply air line to the number one controller which then can not bleed off air. This forces the full 15 psi air to the 12 in. air-to-close valve, closing it, effectively preventing steam from passing all the way back to the steam hammers where it would condense and cause no end of trouble.

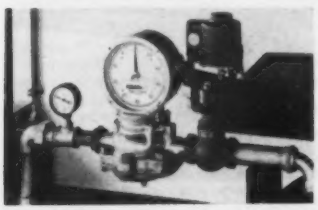
Simultaneously, when the solenoid valve closes the air supply to the No. 1 controller, the air build-up causes the snap-acting pneumatic relay to divert and permit supply air to pass to the 4 in. pneumatic air-to-open diaphragm valve in the 150 psi high pressure steam supply.

This valve, now having the benefit of the full 15 psi control air, rams open and steam flows into the heater line from the 150 psi line instead of the 30 psi hammer exhaust line.

The heaters don't get the full 150 psi, however, because pressure controller No. 2—the same type as pressure controller No. 1—reduces this 150 psi pressure to 15 psi by controlling the air to the 4 in. valve. *From Industrial Control News, Published by Minneapolis Honeywell Regulator Co., Philadelphia, Pa.*

Batch Measurement of Liquids

IT APPEARS that a large number of industrial plants are still making batch measurements of liquids by running the liquid into a volume measuring tank or a tank mounted on a scale. The operator uses the volume or scale readings to determine when the correct amount of liquid has been placed in the tank. The outlet is then opened and the tank is drained to the point of use.



Combination of volumetric meter and electric solenoid valve makes automatic measurement of liquid batch possible

The method of measuring which is fast, simple, and usually most accurate is to measure the liquid by a volumetric meter as it flows through a line. After a predetermined quantity has been delivered, flow is stopped by a meter-actuated solenoid valve.

Practically any liquids which are to be delivered in fixed quantities can be so measured. Until recently the list was limited to those liquids which were not corrosive to bronze. However, with the new stainless steel chemical meters now available, the list is broadened.

The concrete transit-mix industry was one of the first to adopt automatic predetermined volume control of its water, and limited applications had been made in many other industries. However, the field of possible savings to industries has been scarcely touched, and many plant engineers have yet to learn the possibilities in their own plants. *From Meters and Controls, published by Meters and Controls Inc., Chicago, Illinois.*

Tough Lining for Tumbling

WITHIN THE SPAN of a few short years, the science of barrel finishing has advanced so rapidly that only those in close touch with the industry have been able to keep up with it. Modern techniques and modern equipment have made a versatile tool of the old tumbling barrel.

Two things are behind barrel finishing's remarkable progress—better understanding of the process variables and development of equipment which permits proper control of the variables.

Research has shown the importance of such factors as load height within the drum, speed of drum rotation, size of abrasive stone, water level, type of compound, cycle time, and ratio of parts to abrasive.

Knowing the significance of these factors, it has been possible to produce better abrasives and better equipment. Among the major improvements in equipment design are variable speed drive, better drum linings, electric cycle controls, and new types and sizes of drum.

One of the most important of these innovations has been the adoption of neoprene linings for the drum. The resilience of this material combined with its resistance to chemical action and abrasion give a neoprene-lined barrel many advantages over unlined and wood-lined tumbling equipment.

Linings made of neoprene are permanently bonded to the drum by the manufacturer, rarely require maintenance, and wear many times longer than wood. They do not absorb process-chemicals from one batch to be leached out on a subsequent batch. In addition, these linings do not pick up the abrasives or absorb the chemicals used in processing.

Workman exposes neoprene lining in tumbling barrel used by Minnesota firm

After testing various types of lining material, the Almco Div., Queen Stove Works of Albert Lea, Minnesota, reports that "neoprene is the most satisfactory, both from the standpoint of long life and cost." It uses this type of lining exclusively. *From Neoprene Notebook, published by E. I. du Pont de Nemours & Co., Wilmington, Delaware.*

Handy Welding Jigs

WELDING PIPE or bar stock at right angles is an easy job with jigs which correctly position the pieces to be welded. These can be built from scrap metal with the aid of an oxy-acetylene blowpipe.

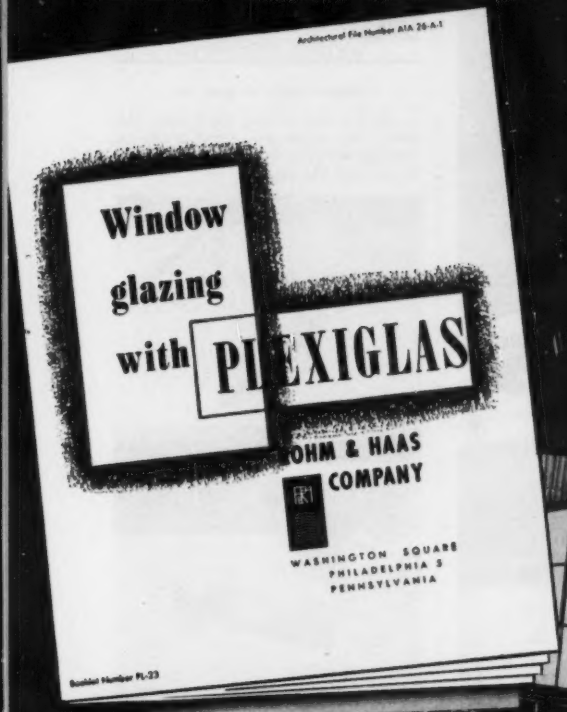
Angle iron and flat iron struts are needed to make the right angle aligning and holding jig. Choose the size and length of angle iron best suited to your needs. Clamp these angle iron pieces to the inside edges of a carpenter's square. Next, cut both ends of each strut at a 45 deg angle. Now, braze-weld the struts between the angle iron parts.

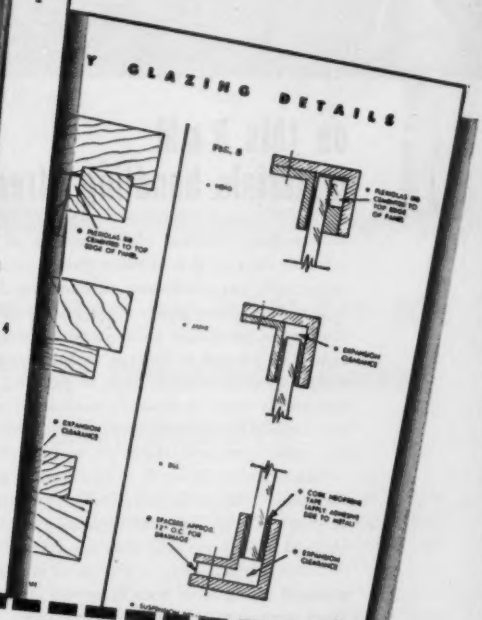
If the heat of welding has caused the jig to become warped, hammer the longer strut until it bends slightly and returns the jig to shape.

Angle iron and flat iron struts also form the main parts of the straight pipe welding jig. For the clamps on this jig, two ½ or ⅝ in. nuts, two bolts to fit, and some narrow strap iron about 1 in. wide are needed. Braze-weld the 2 pieces of flat iron to the angle iron base. Shorter lengths of angle iron are then welded on top of the struts to form the pipe or bar rests.

The clamps are made by welding a nut to a piece of strap iron which has been bent to shape and welded to the stock rests. Cut the heads from the bolts. Bend the bolt shanks

MAIL COUPON FOR NEW 16-PAGE BOOKLET





End Frequent Window Breakage and Cut Glazing Replacement Costs

This booklet shows how industrial plants, troubled with frequent window breakage, can cut maintenance costs by using PLEXIGLAS acrylic plastic for replacement glazing. Tough, resilient PLEXIGLAS—light in weight and highly resistant to breakage—can be installed quickly and easily in standard metal or wood sash. It is available as completely transparent material, or in translucent grades that transmit a high percentage of light, provide excellent diffusion, minimize sky glare, and curtail solar heat.

For complete details, mail the coupon today.

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ROHM & HAAS COMPANY, PLASTICS DEPARTMENT
Washington Square, Philadelphia 5, Pa.

I want to know more about cutting glazing replacement costs with PLEXIGLAS acrylic plastic. Please send me ____copies of your new booklet, "Window Glazing with PLEXIGLAS."

*Name*_____

*Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

NO DETOURS

on this R & M materials handling "freeway"

By handling overhead with a network of thirty-six 4,000 lb. capacity R & M hoists this major steel fabricating concern(*) has eliminated all handling detours.

Sufficient lifting power is always available to handle the largest fabricated units, incoming shapes are unloaded, carried to storage or sub-assembly areas, moved to final assembly jigs, to painting areas and finally on to outbound transport all without tying up a nickel's worth of floor space—without causing any traffic jams and, above all, with *no detours*.

The efficiency of an R & M materials handling "freeway" may solve your traffic problems, eliminate or ease the need for plant expansion, and do it quicker, and at less cost than you deemed possible.

As to dependability — several of the R & M hoists pictured above have been in service over ten years with only minimum maintenance.

Need this kind of help? Then write today for Bulletin No. P122E.

**name on request.*

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

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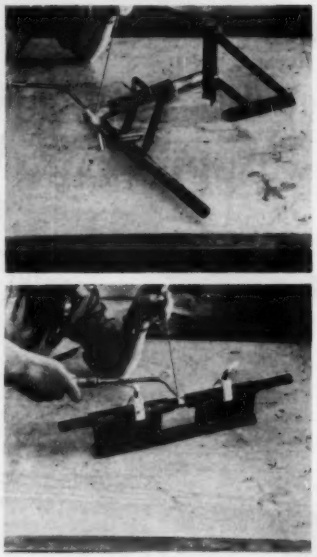
PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

to 90 deg and thread them onto the nuts. The open gap in the center of the jig permits welding to be done all around the pipe.



Upper view shows the use of the angle jig in joining pipe. Straight line jig is being demonstrated in the lower view

Both of these jigs can be used for pipe, tube, and bar stock of all shapes. *From Linde Tips, published by Linde Air Products Co., New York, New York.*

Tool Steel Hardening

"WHAT PARTICULAR characteristic do the high speed and hot work tool steels possess that enables them to retain wear resistance and strength at elevated temperatures?," users of these steels often ask.

To explain this, let us first look at the basic reactions of a hardening operation. We could describe hardened steel as consisting of a multitude of tiny submicroscopic particles of hard carbide locked within the grains of iron. In this condition, these grains cannot be deformed and thus the material is strong and brittle.

Subsequent heating of the hardened steel, tends to cause these tiny carbide particles to move toward one another and agglomerate, or join together. The result is a gradual growth of the carbides, which lessens their effect on locking up the

(Continued on page 38)

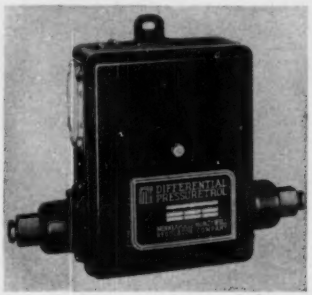
POWER PLANT ENGINEER SUBMITS WINNING IDEA IN CONTROL DERBY

An engineer in an Illinois power company writes us about a method he has devised for keeping coal feeders free of stoppages, so fuel will flow freely to the stoker. This unique system won an award in the Honeywell Industrial Control Idea Derby.

Coal comes by gravity from a storage hopper, through a mechanical feeder and then into the continuous stoker. If coal jams anywhere along the route, several ways have been devised for breaking the stoppage. But plant men want to know about the jam before coal flow is seriously interrupted.

That's where Honeywell control comes in. Low pressure air is piped into the coal feed system. A Honeywell Differential Pressure Controller is connected to two selected points along the coal chute. As long as coal keeps moving, a small pressure difference exists between the selected points. As soon as the coal stops, however, the pressure equalizes across the Controller, which immediately sounds an alarm and starts a vibrator or other equipment to break the jam.

By connecting the Honeywell Controller to the top of the hopper, operators are warned against overfilling the storage bin. A further connection tells whether coal is reaching the stoker.



Honeywell Differential Pressure Controller

NEW NEWSPAPER HELPS PLANT ENGINEERS

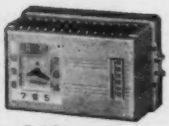
Honeywell's Industrial Division now issues a periodic publication—*Industrial Control News*—which contains detailed information on many new and unusual applications for automatic controls throughout industry. In its pages, production and maintenance men tell how they are reducing costs and increasing efficiency on all types of equipment. According to a release from the company, anyone interested in industrial controls can contribute to *Industrial Control News* . . . and receive copies . . . by sending name, company, title and address to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Station 40, 4491 Wayne Ave., Philadelphia 44, Pa.

do you have an "IDEA" for the

Honeywell Industrial Control

IDEA DERBY?

Just send us a sketch and description of how a non-indicating control is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! An impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a Honeywell Electric Clock Thermostat or one of the other special awards. All material submitted becomes the property of MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Philadelphia 44, Pa.



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HONEYWELL ELECTRIC CLOCK THERMOSTAT

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Honeywell
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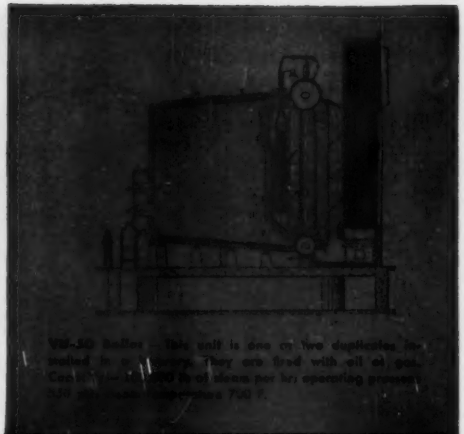
VU – the choice of Leaders in every Industry

Wherever steam is important for power, heating or process – you'll find C-E Vertical-Unit Boilers (Type VU) establishing new standards of reliable, efficient operation. In industry after industry, leading manufacturers are setting the pace with VU Units.

Food and Beverage companies are typical examples of the widespread acceptance Vertical-Unit Boilers find in industries everywhere. Many of the leading food processors, as shown below, are consistent users of VU Boilers.

But why list only the larger companies, when so many VU Boilers are used in smaller plants? Chiefly because the practices of the big companies form a helpful buying guide. Large companies buy boilers frequently so their experience is always up-to-date. They buy them for different plant locations and for a variety of operating conditions. Thus, they have the accumulated knowledge and broad experience needed to make sound boiler selections.

You can profit from this industry's experience – or from that of any industry that has large steam requirements. So if you need reliable, low-cost steam – from 10,000 to 350,000 pounds per hour – investigate the advanced design... sound construction... proved reliability of C-E Vertical-Unit Boilers.



VU-40 Boiler – This unit is installed in the plant of a food product company. It is fired by oil; arranged for future pulverized coal. Capacity – 60,000 lb of steam per hr, operating pressure – 250 psi; steam temp. 600 F.

Leading Food and Beverage Companies using VU Boilers in one or more plants

American Maize Products Co.
American Sugar Refining Co.
Anheuser-Busch, Inc.
Armour & Co.
J. E. Brach & Son, Inc.
Curtis Bros.
General Foods Corp.
H. J. Heinz Co.
Kind & Knox Gelatin Co.
Penick & Ford, Ltd., Inc.
Joseph Schlitz Brewing Co.
W. F. Schrafft's & Sons, Inc.
Spreckels Sugar Co.
Sunshine Biscuits, Inc.
Swift & Co., Inc.
Wm. Wrigley, Jr., Co.

COMBUSTION ENGINEERING — SUPERHEATER, INC.

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

S-398A

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

For more facts circle 526 on Reply Card

BULLETINS just released and of immediate plant interest

PUMPS, PUMPING

101 How to Pick a Pump—Twelve-pp Bulletin 52C9035J, titled, "Handy Guide to Selection of Centrifugal Pumps," covers general purpose, double suction, multi-stage, special purpose, marine and mixed and axial flow pumps. It also has a head-capacity table for single-stage double suction pumps. Special purpose pumps mentioned include solids handling, paper stock, sewage, rubber-lined process, coolant and circulating units, process pumps. Allis-Chalmers Mfg. Co.

102 Installing a Pump—Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated with installation diagrams, includes tables of friction loss. Viking Pump Co.

103 Rotary Pump Service Manual—The installation, operation and maintenance of rotary pumps are covered in 12-pp Service Manual 100-2. Subjects discussed include installing of foundation bolts, alignment, supporting vertical pumps, grouting, piping, suction lines, hot liquid pumps, rotation, packing, dismantling, reassembly, starting operation and standing idle. Includes charts and sectional elevation drawings. Warren Steam Pump Co., Inc.

104 Frame Type Centrifugal Pumps—Designed for most ordinary pumping jobs requiring capacities to 500 gpm and heads to 135 ft, the centrifugal pumps described in Bulletin 52B9691A are built for V-belt drive, can be mounted in a variety of positions, and connected to any type of prime mover. Cross section diagrams of the three available types show cast iron frame. Allis-Chalmers Mfg. Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

105 Diaphragm Valves—Operation and installation features of manufacturer's diaphragm valve for handling slurries, fluids and gases at temperatures to 150 F and pressures to 150 psi are presented in 48-pp Catalog V-52. Provides design and construction details, selection and ordering information, and specifications. Generously illustrated and arranged for easy reference, catalog also gives data on other valves and equipment. Mills-MacCanna Co.

106 Electrically Operated Valves—This bulletin provides data on manufacturer's solenoid valves available for pressures to 3000 psi. Adjustable timing on the closing stroke is available to pressures of 300 psi, a feature designed to eliminate shock on supply lines. These valves are intended for hydraulic operations, oil, water, steam, air, gases and any media not harmful to bronze. Nine types illustrated, dimensions given. The Atkomatic Valve Co.

107 Automatic Regulating Valves—Twelve-pp Bulletin 535 covers a line of steam pressure regulating valves and introduces three new types. Complete sizing tables included, as well as capacity tables, and helpful selection data. D'Arco Div., Kaye & MacDonald, Inc.

108 When Vacuum Isn't—This informative brochure, "Vacuum Isn't Vacuum to a Steam Trap," discusses the following questions in relation to steam traps: What is vacuum? How does it affect trap operation? Does flash steam from trap destroy vacuum? What are common causes of lack of vacuum? Text is illustrated with diagrams, charts and examples. Armstrong Machine Works.

109 Corrosion-Resistant Piping—Wood-lined steel pipe, saran rubber-lined steel pipe, and wood stave pipe and joints are described as to construction and applications in this bulletin. Also discusses special light gage piping. Michigan Pipe Co.

110 Insulated Pipe—Manufacturer's pre-sealed insulated pipe for underground and weather-exposed piping systems conveying hot or cold liquids or gases is presented in this bulletin. Gives applications, special features, design, construction, fabrication data and specifications. Durant Insulated Pipe Co.

111 Expansion Joint Guide—Catalog CMH-1275, 16 pp, describes company's Flexon corrugated expansion joints and basic theory behind their design. Gives specifications and installation information for the recently designed line now capable of handling more pipeline motion with fewer corrugations. Presents free-flexing expansion joints for low pressure uses, controlled-flexing joints for absorbing greater amounts of traverse, and types for high-pressure uses. Flexonics Corp.

112 Liquid Filters—Twelve-pp illustrated Bulletin D-H, on liquid filters, contains specifications, engineering and performance data, photos and descriptions of recommended filter media, as well as a check list of liquids that can be filtered. Includes detachable data sheet with reverse side left blank for sketches of proposed installations. Dollinger Corp.

MECHANICAL POWER TRANSMISSION

114 Sheave Selector—This slide-chart selector is offered as an aid to purchasers of pocketed chain sheaves and guides, grooved idler sheaves and chain. All specification data required in ordering these products are given. David Round & Son.

115 Designing Cams—Here is a 28-pp technical article on designing cams for controlled inertia and vibration. Tells of a method of design which can be applied to cams requiring strict control of kinematic properties. Summarizes pertinent information on inertia and vibration phenomena in cam operation and presents a practical procedure for limiting their effects. Also discusses advantages of a roller gear drive in many applications. Ferguson Machine & Tool Co., Inc.

116 Ball and Roller Bearings—Sixteen-pp Catalog 28 is a well-organized ordering guide covering a line of ball thrust bear-

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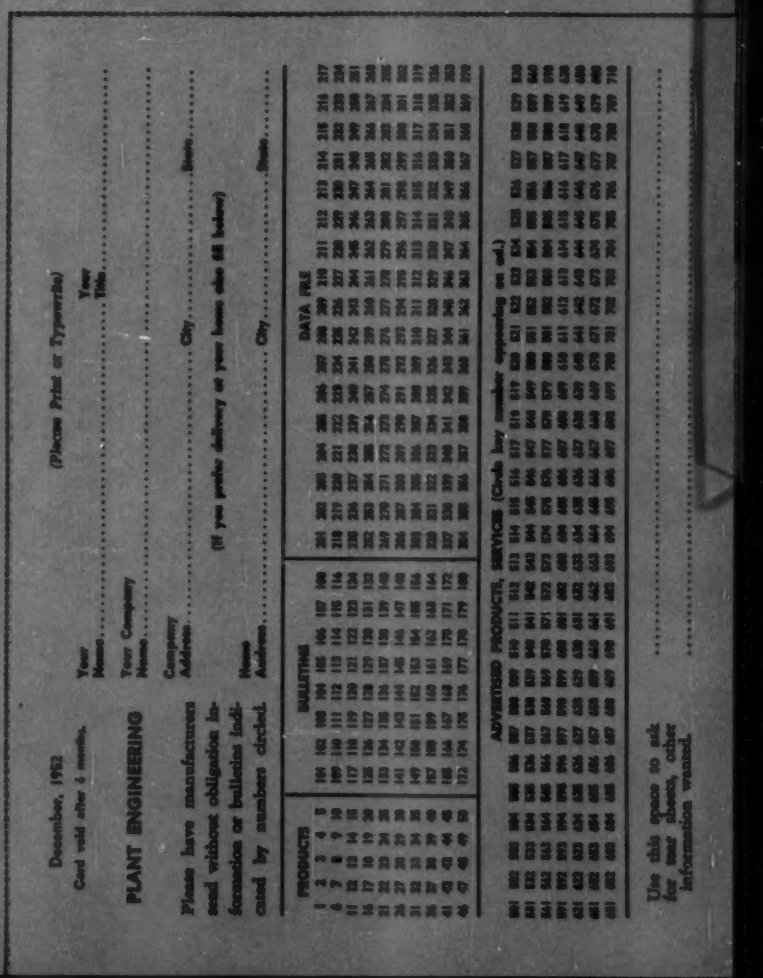

ings, roller thrust bearings, step bearings, journal roller bearings, industrial roller bearings and special bearings. All types are illustrated by photo and dimensional drawings and standard sizes listed in tabular form. The Gwilliam Co.

117 Roller Bearings—Catalog 322, 16 pp. contains specifications of bearing selection for materials handling and other applications. Describes rollers, bearings, roller assemblies, cage and split outer race assemblies together with selection data covering load speed factor, stationary shaft factor and bearing life with shaft and housing limits. Berlin Bearing Co.

118 Air Cylinders—An informative reference booklet, 16-pp Bulletin 731 describes a complete line of air cylinders. Diagrams, charts and photos explain the capacity, type of mounting, etc., of the cylinders, and a listing of engineering features is included. Lindberg Engineering Co.

PLANNING AND PURCHASING

119 Looking for a Plant Site?—To aid in selecting the plant location that will offer the best combination of factors affecting total production cost, this 12-pp plant location brochure is a compilation of 64 basic questions to be answered and evaluated. Discusses selection of factors pertinent to the individual plant, establishment of a scale or relative importance for these factors, sources of information for selection of general areas favorable, and final selection. Other factors covered. Walter Kidde Constructors, Inc.

120 Efficient Purchasing Procedures—Bulletin E-1202, 20 pp, suggests time and money saving procedures for purchasing. Provides a check list of important information needed for efficient operation. Effective methods for processing requisitions, procuring bids, placing orders and follow-up of purchase orders are outlined and case histories reviewed. Space is also devoted to reproduction of forms designed to give better records in less time at lower net cost. Remington Rand Inc.

121 Plant Layout Methods—"A Study of Four Methods of Plant Layout," is an illustrated 16-pp article on four methods of layout as applied to a manufacturing building comprised of shop, laboratories and office. Covers use of two-dimensional paper cutouts; two-dimensional plastic templates with imbedded magnets; three-dimensional models and company's Repro-Templets; and two-dimensional templates of photographic negative material. Discusses speed, accuracy, cost of methods. "Visual" Planning Equipment Co., Inc.

ELECTRICAL, LIGHTING

123 FHP Motor Selector—This pocket-size slide rule provides detailed data on 35 motors in ratings from 1/2000 to ½ hp. Shows motor type horsepower continuous and intermittent, full load rpm, full load amps continuous and intermittent, load efficiency, ventilation, etc., on d-c and shade pole motors. Information on induction motors includes full load speed, horsepower, frame type and torque data. Howard Industries, Inc.

124 Rectifier Stacks — Bulletin GEA-3699A, describing basic characteristics and applications of copper-oxide rectifier stacks, is complete with charts, graphs and tables, illustrating the characteristics, manufacturer, circuit design and use of these rectifiers. Gives ratings, stresses advantages. General Electric Co.

125 Cable Boxes — Sixteen-pp Bulletin BA53 outlines a comprehensive line of cable boxes for plain splicing, for solid inter-connecting, for sectionalizing, with links or fuses, electric insulated cable circuits for system flexibility. Contains photos, dimensional drawings, ratings, and descriptive data. Includes ordering instructions. G & W Electric Specialty Co.

126 Dry Type Transformers — Control circuit transformers designed to provide better voltage regulation with low power factor circuits where the momentary overload caused by high inrush currents is an important consideration are presented in 8-pp Bulletin T-3111. Construction details and advantages, specification charts and wiring diagrams, data on high voltage transformers provided. Hevi Duty Elec. Co.

127 Automatic Voltage Stabilizers—Twelve-pp Bulletin GEA-3754 covers automatic voltage stabilizers ranging from 15 to 5000 va. Contains photos and diagrams of the equipment, explains operational principles and construction and gives complete specifications. Also describes causes and effects of voltage variations, lists typical applications. General Electric Co.

128 Industrial Truck Batteries—How to get more work each day from industrial trucks by means of batteries which give more power in the same battery space is detailed in Bulletin IT-518. Explains how these batteries have more capacity and last longer, discusses two cell types available. Includes full specifications. C & D Batteries, Inc.

129 X-Ray Supplies—Ordering and application information on industrial X-ray equipment is included in this general catalog on X-ray accessories and supplies. Covers film, screens, processing hangers, illuminators and inspection cabinets. Kelco X-Ray Corp.

130 Industrial Lighting Standards—The 44-pp latest edition of the RLM Standard Specifications Book contains detailed specifications for 18 commonly used incandescent and fluorescent industrial lighting units. Includes important revisions and clarifications of existing specifications, and new tables of typical coefficients of utilization and light distribution curves, as well as two new specifications for units for high-bay industrial installations. Available without cost to qualified plant engineers. RLM Standards Institute.

131 Electrical Specialties — One section of 48-pp Catalog 48-A describes and illustrates switches and sockets. The other covers portable lamp guards, wall and receptacle guards, lamp changers and accessories. Included in this section is company's new 5500-G series grounded lamp guard for use with the three wire grounded electrical systems used in many plants. McGill Mfg. Co., Inc.

MATERIALS HANDLING

133 Industrial Trucks—Advanced operational features of manufacturer's Space-Master Model M trucks are presented in this bulletin. Describes both high and low lift types, includes specifications and dimensional drawing. Stresses aisle space savings, articulated linkage, power gear drive. Lewis-Shepard Products, Inc.

134 Coal Handling Technique—This bulletin presents company's Flo-Tubes as a modern way to handle coal. The new development utilizes the principle of a

(Continued on page 123)

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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

grains of iron. Thus, this tempering heat produces a softening of the steel and a gain in ductility.

It has been found that these tiny carbides grow fairly readily during tempering of the plain carbon tool steel. Thus, we find such steels softening in proportion to the tempering temperature. However, certain elements — for example, Tungsten, Molybdenum and Chromium—cause a pronounced resistance of the carbide to agglomeration.

Therefore, as these high speed and hot work tool steels, which contain fairly high percentages of one or more of these alloys, are tempered the submicroscopic particles of carbide resist joining together until temperatures of 1000 to 1100 F are obtained. This explains why these steels are capable of resisting softening from heating to such elevated temperatures.

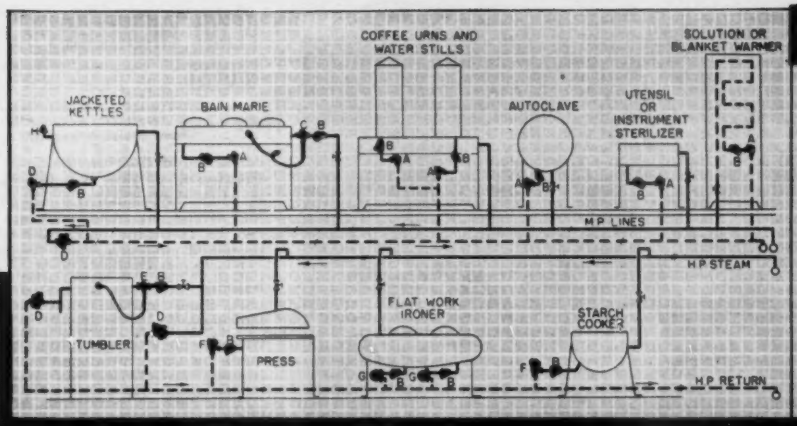
It is generally believed that optimum performance from most tool steels is obtained when they become completely hardened during the quenching operation. In the case of some steels, hardening may be only 80 per cent complete after the quench. While subsequent heating to 1000/1100 F causes little or no softening of this 80 per cent hardened metal, the 20 per cent unhardened metal is affected at this temperature. It actually hardens during cooling from this initial temper. We speak of this occurrence as "secondary hardness."

From these facts it can be realized why the high speed and hot work steels should be tempered at or above the zone of secondary hardness. Furthermore, since approximately 20 per cent of the steel is in a highly stressed, hardened condition after the first draw, a second draw should be given to ensure complete tempering and stress relief. *From Atlas Steel News, published by Atlas Steels Ltd., Welland, Ontario.*

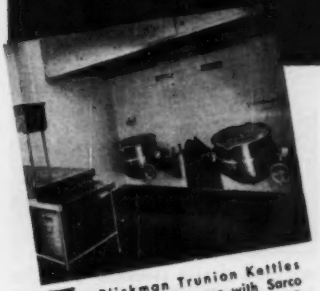
Laminated Lumber as Used In Plant Construction

GLUED LAMINATED wood girders and purlins are being used in a new building erected in Chicago, Ill., for the National Video Corporation. By comparison with structural steel roof framing the over-all cost is substantially lowered.

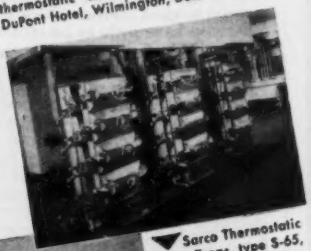
Maintenance costs are brought down by the lesser surface area exposed in the roof. Not only is there less area for painting, but the painting job is easier. The building fire insurance underwriters confer far more favorable rates on this type of



BUILDING SERVICE EQUIPMENT



S. Blickman Trunion Kettles equipped by manufacturer with Sarco thermostatic steam traps, type S-65, DuPont Hotel, Wilmington, Delaware.



Sarco Thermostatic Steam Traps, type S-65, on S. Blickman Vegetable Steamers at Prudential Insurance Co., Newark, N. J.

Sarco Inverted Bucket Steam Traps on large size jacketed kettles by Legion Utensil Co.

● BUILDING SERVICE EQUIPMENT is just one example of the many steam trapping problems encountered under one roof.

Sarco's four distinct types of steam traps make it possible to select the proper type for each application and yet all of the same manufacture.

That is why Heating Engineers and Piping Contractors prefer Sarco.

Undivided responsibility assures over-all satisfaction to the ultimate user — the objective of both the Engineer and Contractor.

Equipment manufacturers standardizing on Sarco Steam Traps and Controls do so with complete confidence, knowing Sarco will insure proper performance of their equipment.

Sarco Company, Inc., Empire State Bldg., New York 1, N.Y. • Sarco Canada Ltd., Toronto 8, Ontario.

Sarco Thermostatic Steam Trap for kitchen and hospital equipment, type S-65 to 65 psi, type H, 100 to 100 psi.

Sarco Float—Thermostatic Steam Trap

Liquid Expansion Steam Trap

Sarco Inverted Bucket Steam Trap.

SARCO saves steam

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In the *Speedway* you get alloy steel gears, self-lubricating ball and roller bearings, preformed improved plow steel cable, grooved drum, rigid metal weatherproof wire conduits, silver contact controls, and other important features. The WRIGHT *Speedway* is designed for long life and requires minimum maintenance. Capacities from ¼ to 10 tons.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

construction than on the joist type. Because of its slow burning characteristics, the laminated lumber framing merits an insurance rate that can be favorably compared to unprotected steel structural framing.

It is interesting to note that in the building of these laminated members there are no nails or other hardware used. Reliance is placed entirely on a casein glue. Studies made by those interested in fire insurance reveal that the glue performs more satisfactorily than do nails.

The laminated wood member has essentially unlimited size possibilities. This is particularly important in view of the diminishing stands of lumber that furnish large sizes required for structural members

Workman is seen toenailing purlin to the large size laminated wood girder

such as girders. The standard commercial sizes of lumber which would otherwise have little or no structural application can be used to produce large structural members.

Materials of the sizes used in laminated construction can be dried in a short time. It takes less time for small green timbers to dry out than large green ones. Hence, thoroughly seasoned timbers that will be subject to only a minimum of warping, twisting, and shrinking after installation can be provided quickly. *From Central Manufacturing District Magazine, published by Central Manufacturing District, Chicago.*

What Cutting Speed?

THROUGHOUT INDUSTRY there are many machining operations on which cutting speed might be profitably increased. Too often the cutting speed for a given material and operation has been set in accordance with some generalized recommendation—or to provide some arbitrary value of tool life—which does not necessarily give the minimum costs per piece.

The criterion for effective machine

operation is total cost per piece. For a given feed increment (per revolution, or per tooth) as the cutting speed is increased the time for the cut is decreased, thus the actual metal cutting cost is lowered.

In opposition, however, is the fact that as the cutting speed is increased (with all other conditions constant) the tool life is decreased, thus causing an increase in cost on account of more frequent tool changing and sharpening.

The optimum cutting speed in terms of minimum cost per piece, is therefore reached when the rate of decrease in cost caused by an increase in cutting speed, is balanced by the rate of rise in cost due to the decrease in tool life.

Wherever the production volume on a given workpiece will justify it, the cutting speed should be determined from a careful analysis of all the cost-controlling factors. *From an article by Hans Ernst in Report, published by The Cincinnati Milling Machine Co., Cincinnati, Ohio.*

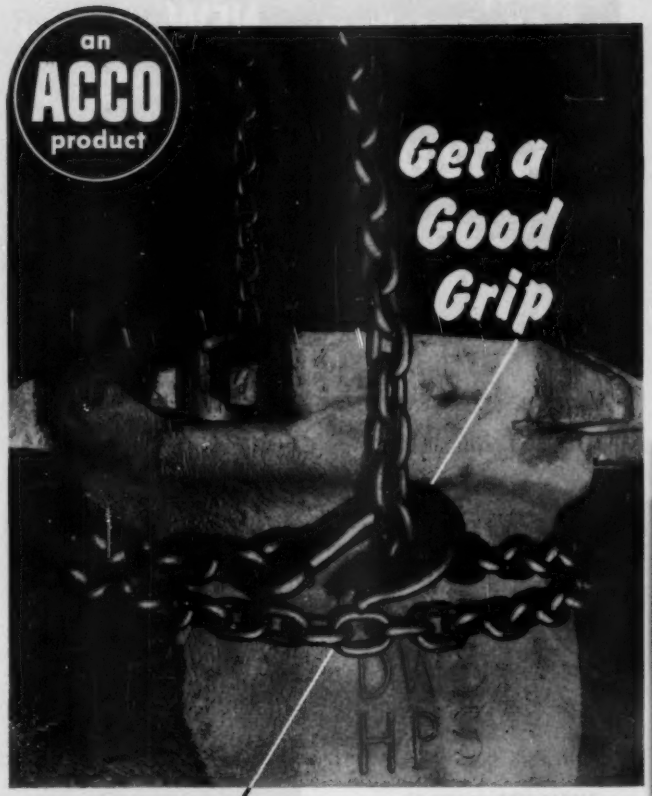
Adhesive Takes a Lot of Pull

ANYONE who thinks of sports as recreation should ponder the story of Robert Smith-Johannson, a young chemist at General Electric Company.

He was set on the path of an important chemical discovery when an ice coating formed on his nose while he was skiing. Though he was a boy when this frosty marvel occurred, he has since delved into phenomena similar to it to discover a new chemical that bonds silicone rubber to steel.

While working out a new ski wax to combat adhesion, he evolved a new way of looking at the entire problem. He believed that adhesion

Adhesive holds silicone rubber to steel under load of 300 lb of rocks in tub



● ACCO *Registered* Sling Chains are engineered to the job. The rings, the links, the hooks—all parts are built and tested together as a complete unit.

Look at the rugged design of the unretouched hook in the photo above. See the good grip it has on the tough yet light-in-weight, easy-to-handle Endweldur chain. Think of the lifting safety and efficiency you would get from ACCO *Registered* Sling Chains in your own shop.

Your American Chain distributor will give you facts and specifications on ACCO *Registered* Sling Chains. Call him today or write us for DH-314 ACCO *Registered* Sling Chain Catalog.

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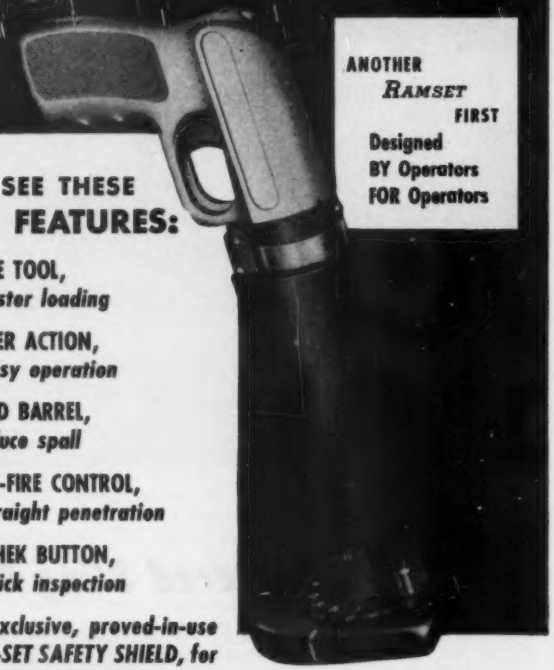

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- VISI-CHEK BUTTON, *for quick inspection*
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Faster, lighter, easier handled, the new RAMSET JOBMASTER sets a record pace for steel and concrete fastenings. Properly trained workmen quickly become skilled operators because of smooth, simple, natural motions of loading, placing, firing. Positive controls bring improved accuracy and efficiency . . . and still lower fastening costs. Ask your dealer for demonstration of how RAMSET's years of pioneering have made the new JOBMASTER the proved-in-performance leader.

Ramset Fasteners, Inc.

Ramset Division, Olin Industries, Inc.

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Product Patent No. 2470117. Other Patents Pending.

Ask for Demonstration TODAY!

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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

was based on continuity of structure. If the crystalline structure of two substances was very similar in form and dimensions, they would fit together.

Later, at General Electric he found that his work on ski wax applied directly to the problem of making silicon rubber stick to steel—only he had to promote adhesion, not prevent it. He knew that the surface of silicone was packed so densely with inert "methyl groups" that an ordinary outside molecule couldn't get its foot in the door, so to speak. But by patient matching of molecular structure he found a substance that would "fit."

Today this substance is constantly finding new uses. It holds a silicone rubber cushion between delicate instruments and a vibrating steel engine, for instance. A single coat of the new adhesive agent takes the place of 2 or 3 coats of rubber cement and the elaborate baking process previously used.

The adhesive is even being used to make silicone rubber act as bond between combinations of other substances, such as aluminum, brass, copper, tin, magnesium and stainless steel. *From Steelways, published by American Iron and Steel Institute, New York, N.Y.*

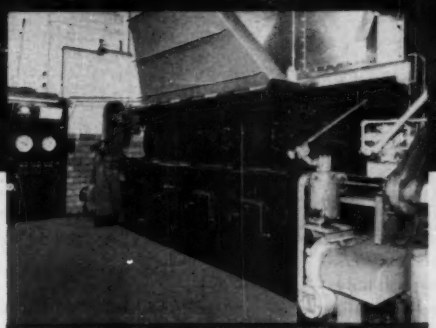
Glass Welding on a Lathe

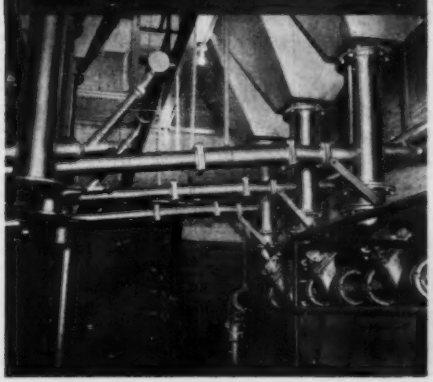
ONE OF MANKIND'S most important discoveries and oldest arts is the manufacture and molding of glass. Combined with another ancient tool—the lathe—it makes the latest wrinkle in the production of modern laboratory equipment by the Atlantic Refining Co.'s research and development section in Philadelphia, Pa.

Tiny jets of white hot flame replace the cutting tool of the conven-

Tiny flames heat the end of glass tubing prior to welding to other section

Nash Motors SELECTS
DETROIT ROTOGRATE STOKERS





Nash Motors, Division of Nash-Kelvinator Corporation purchased two 100,000 pound per hour RotoGrate Stokers for their Kenosha plant. Boilers are Babcock and Wilcox 4 drum Stirling with superheaters and economizers. A similar stoker unit was purchased for the Nash Milwaukee plant.

Detroit RotoGrate is an improved spreader stoker. Grates move slowly forward to discharge the ash at the front. Coal feed, grate speed and air supply are synchronized at all capacities. A wide range of Bituminous Coal or Lignite may be burned. Controlled high turbulence and rugged, dependable cinder reinjection system contribute to fuel economy. Grates are of unique design which permits more burning capacity per square foot.

Write for RotoGrate Bulletin.

DETROIT STOKER COMPANY

GENERAL MOTORS BLDG., DETROIT 2, MICH.

District Offices in Principal Cities · Works in Monroe, Mich.

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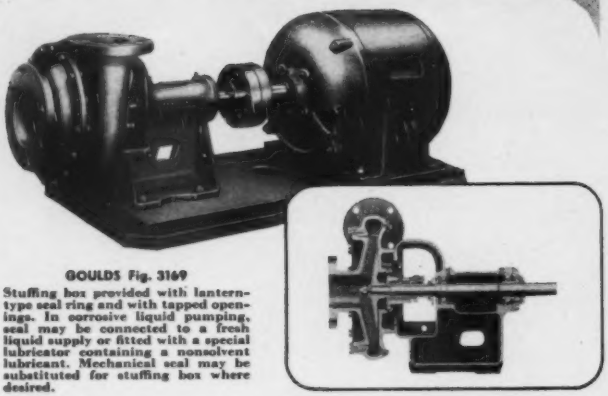
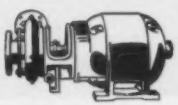
Goulds single stage... open impeller centrifugal



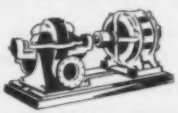
GOULDS Fig. 3169
Stuffing box provided with lantern-type seal ring and with tapped openings. In corrosive liquid pumping, seal may be connected to a fresh liquid supply or fitted with a special lubricator containing a nonsolvent lubricant. Mechanical seal may be substituted for stuffing box where desired.

Other GOULDS Pumps for the Chemical Industry



GOULDS Fig. 3650
"Close-Cupld" single-stage centrifugals for general industrial use. Capacities to 2000 G.P.M. Heads to 400 ft.

GOULDS Fig. 3750—"Support Head" Goulds centrifugals for general and many special liquid handling applications. Up to 6000 G.P.M. Heads up to 400 ft. Bulletin 715.1.



GOULDS Fig. 3430
These double-suction, single-stage Goulds centrifugals will handle up to 15,000 G.P.M. Heads up to 500 ft. Send for Bulletin 721.2.

One pump that does many different jobs

- General Water Service
- Transfer
- Processing
- Slurries
- Circulation
- Factory Wastes
- And Many Others

This low cost Goulds Fig. 3169 centrifugal pump offers tremendous versatility. It is as much at home in industrial processing as it is in handling general water service or plant wastes. Its simple, sturdy construction assures long service life with a minimum of maintenance.

Compactly built, this pump is a real space saver. Its modern hydraulic design assures high operating efficiency with relatively low power consumption. Available in a wide range of sizes for both motor and belt drives. Capacities to 1080 G.P.M. Heads to 290 ft. For complete details and specifications, write for Bulletin 720.4.

MEMBER

Goulds PUMPS INC. Seneca Falls New York

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

tional lathe, while both heads of the machine revolve in synchronization.

A specially designed grip holds the glass sections firmly but gently, and the speeds of rotation—which are variable—are slower than for metal or wood working. One of the neatest tricks the lathe does is welding two sections of glass together—as in fitting a neck to a body of a flask.

When the glass has reached the proper temperature, the two sections are carefully brought into contact. Then a carbon spatula is used to smooth the union until the two sections become as one. *From The Atlantic Magazine, published by the Atlantic Refining Co., Philadelphia.*

Batteries Keep 'Em Running

HUNDREDS of dollars in labor lost . . . hundreds of dollars in production time and in materials lost . . . that is the price Visking Limited would have to pay for a power interruption . . . even for as little as 10 sec. Officials of the firm estimate that it would take a full day to completely overhaul and clear one of the giant, complex extrusion machines, should such a power failure occur.

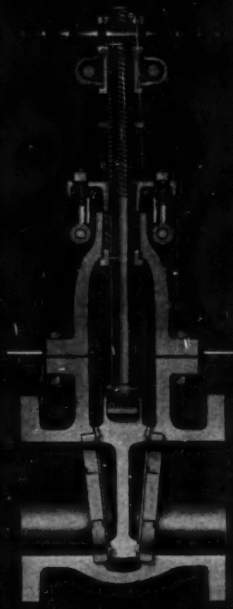
In order to assure that each extrusion machine continues to turn out its thousands of feet of cellulose casing every day, Visking has installed a battery standby power supply system. This is considered sufficient to keep all vital machinery working and provide emergency lighting wherever it is required in the plant.

The extrusion machines and associated units operate on either a-c or d-c and are automatically switched to the emergency battery system when normal power supplies fail and back again when regular service is resumed.

Since the firm began operation in Canada over 2 yr ago, this emergency power system has been pressed into service several times with complete success. On one occasion, the regular power supply was deliberately cut off to test the emergency system. Automatic switches cut in the storage batteries instantly and vital parts of the process were kept in operation for over 45 min.

At the end of this time, the condition of the batteries satisfied officials that the process could continue on battery power for a much longer period of time if it became necessary.

The emergency power supply consists of 2 banks of batteries. One bank of 120 cells provides 240 v for operation of the extrusion and associated machines. The second bank of



W

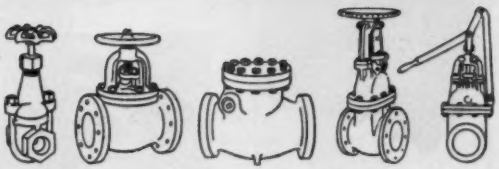
IRON

COMPLETE LINES OF IRON VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of types, pressure ratings, sizes, and patterns for general industrial use.

Walworth also manufactures complete lines of valves (including Lubricated Plug Valves), and pipe fittings made of steel, bronze, and special alloys.

These valves and pipe fittings, plus Walworth-made pipe wrenches total approximately 50,000 items and are sold through distributors in principal centers throughout the world.

Walworth engineers will be glad to help you with your problems. For further information call your local distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, New York.



Iron valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 726F Standard Iron Body, Bronze Mounted, Wedge Gate Valve with flanged ends. This line of valves is available in sizes 2 to 30 inches. Similar valves of All-Iron type are also available.

WALWORTH

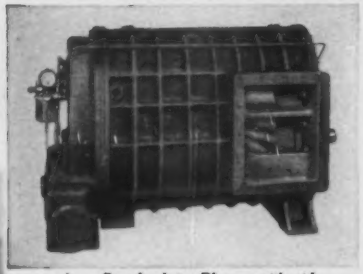
Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

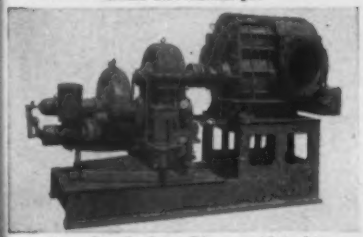
60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

STANDARDAIRE BLOWERS *for easy* ADAPTABILITY



Standardaire Blower with side intake and discharge.



Standardaire Blower with turbine and gear drive unit.

Standardaire Blower with side intake and end discharge.

To meet the specific needs for industry, Standardaire's unique design provides for maximum flexibility in meeting unusual requirements for intake and discharge connections. For example, the blower intake or discharge ports can be located on the end, top, bottom or sides···· two intake or discharge ports may also be provided when necessary. These exclusive features, plus provisions for direct drive by a power unit of your choice, are typical examples of Standardaire's adaptability.

Standardaire Blower with single top intake and two side discharge ports.

Installation showing three Standardaire Blowers.

Write . . .

Read Standard Corporation, Dept. F67
370 Lexington Ave., New York 17, N.Y.
BLOWER-STOKER DIVISION

AXIAL FLOW STANDARDAIRE BLOWER

READ STANDARD
CORPORATION

NEW YORK • CHICAGO • YORK • LOS ANGELES

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

60 cells supplies power for switch gear operation and for a 120 v emergency lighting system covering some 15,000 sq ft of the plant.

Electrical supervisor checks one of 180 batteries in the standby power system

Batteries are kept fully charged at all times by two rectifier chargers installed in the battery room. These chargers automatically switch from float to charge rate after each emergency. *From Exide Topics, published by Exide Batteries of Canada Ltd., Toronto, Canada.*

Concrete Wired for Strength

SLENDER STEEL wires with an ultimate strength of more than 200,000 psi, imbedded under tension in concrete, make a valuable construction material.

Steel wires can be used in two ways in prestressed concrete structures. In one, concrete beams are cast with holes bored lengthwise on the sides where the tension is expected to be. After the concrete has been cured, wires or bunches of wires are threaded through the holes. The wires are tightened against the ends of the beams until the desired compression is reached. Special anchorages hold the wires in tension.

In the second method, wires are tightened to the proper tension, and then a concrete beam is cast around them. The concrete and wire hold together, especially if the wire rusts a little. When the ends of the wires are released from the tensioning equipment, the built up stress is transferred to the concrete.

The effect of prestressing, its proponents explain, is to give concrete beams more than the very limited tensile strength they possess without reinforcement. The wires are not expected to replace reinforcing bars; in fact, the prestressing technique may be applied to bars, for certain uses. *From Steel Facts, published by American Iron and Steel Institute, New York, N. Y.*

Slings...any type...any size your job requires

MACWHYTE ATLAS SLINGS
Atlas Round-Braided Type 1CT Sling
Drew Flat-Braided Type 1 Sling
Monarch Single-Part Type 1 Sling
Macwhyte Safe-Guard Type 1 Sling
MACWHYTE DREW SLINGS
MACWHYTE MONARCH SLINGS

Macwhyte Slings

Here are four of the hundreds of slings pictured and listed in the newest Macwhyte Sling Catalog. All these slings are made to order in any size with fittings needed for your job. All three types of body are available: round-braided, flat-braided, single-part. Macwhyte has worked with hundreds of sling users toward more efficient materials handling. Our engineers are ready to study your sling needs and make recommendations.

For cranes and hoists specify PREformed Monarch Whyte Strand Crane Rope made by Macwhyte.

MACWHYTE COMPANY
KENOSHA, WIS.

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable, Safe-Lock Assemblies, Monel Metal and Stainless Steel Wire Rope.
Mill depots: New York • Pittsburgh Chicago • St. Paul • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

New Macwhyte Sling Catalog.
Send today for complete sling catalog containing detailed information about slings for every need.

10148

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PLANNED POWER PAYS

Electrical shutdowns eliminated in new Lever Brothers plant

Continuity of service is extremely vital to the processing of soap, detergent and edible oils at the new 25-million-dollar Lever Brothers plant in Los Angeles. Many operations are continuous. Even a short interruption can be costly.

Based on this factor, Bechtel Corporation, the engineers and constructors, assisted by Westinghouse, specified a secondary network system. It contains six interconnected power centers that maintain service even though a primary feeder may be faulted. Secondary faults are isolated quickly. The most complete service continuity is assured. And important, too: the initial investment was only 2% more than the *least* expensive system considered.

Careful planning has also taken full advantage of the flexibility of the network system. Future loads and additional capacity can be accommodated easily and economically.

In addition, the inherent flexibility of Westinghouse Power Centers has been utilized fully. Lower maintenance becomes a reality since these standardized units have interchangeable parts. Their Westinghouse Dry-Type Transformers allow them to be located safely anywhere in the plant.

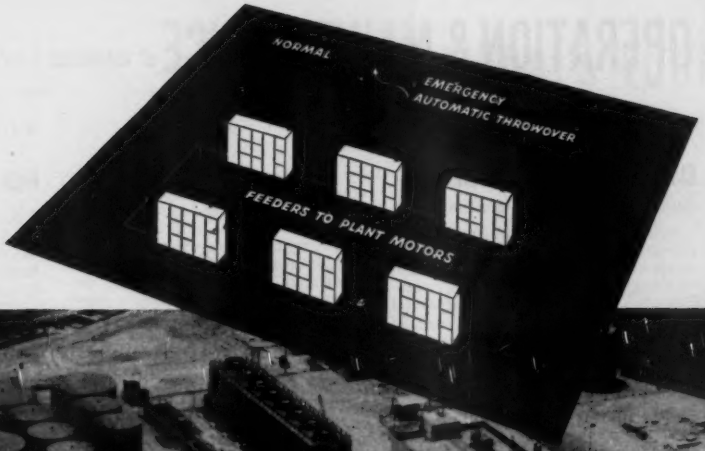
Consider this: It takes *sound planning* and *co-ordinated equipment* to provide modern distribution systems, capable of meeting your plant's power needs today and in the years ahead. Westinghouse offers you *both* . . . backed by years of experience, gained throughout all industry.

A call to your nearest Westinghouse office will bring an application engineer—well qualified to discuss your system problems with you and your engineers. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94953

YOU CAN BE SURE... IF IT'S

Westinghouse

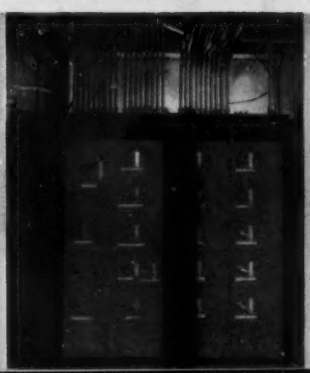
SYSTEM PLANNING



Above diagram shows two incoming sources of power which serve the main 4,160-volt Westinghouse Switchboard. Power failure on the primary source automatically throws in the emergency power.

Right: Standardized Westinghouse Power Center is interconnected with five others in the secondary network system. Complete service continuity is assured.

Left: Unitized Westinghouse Control Centers have special enclosure. This solves exposure problem during daily operation and hosing down.



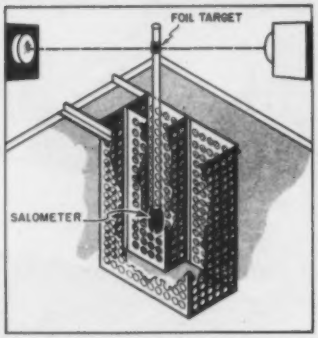
Edited by H. E. B. Anderson

Electric Eye Watches Brine

Contributed by H. Nye Josleyn

MAINTENANCE of brine strength in refrigeration circulating tanks is made positive and easy with the use of an electric eye. An even, well-balanced brine strength is obtained with a minimum of effort, and a minimum of salt.

To arrange the device, construct a box of perforated sheet metal, and with the same material, install a square enclosure along the inside



Cutaway view of perforated chambers housing salometer in brine tank corner

length of one corner. Angle iron supporting strips welded to the top edge of the tank support the box.

The corner location provides protection for the salometer and convenience in mounting the electric eye. A target for the electric eye consists of a layer of aluminum foil cemented around the salometer stem.

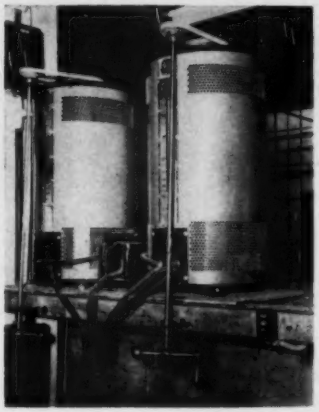
A float on the tank actuates a water pump, to keep the tank liquid level constant. Weakening of the controlled solution causes the salometer and target to gradually lower until the target cuts the beam of the eye. This breaking of the beam starts the pump on the system's make-up tank to pump strong make-up brine into the main tank. As the controlled solution in the tank becomes strengthened, the salometer and target rise out of the beam, and the pump is shut off. Agitation between the return brine and the circulating brine pump gives adequate mixing to hold the brine to within 3 degrees salometer under average temperature ranges.

Going to the Plant Maintenance Show?

The 1953 Plant Maintenance Show and Conference will be held in the Public Auditorium, Cleveland, from January 19th through 22nd. Readers wishing Advance Registration Cards can obtain them by writing "Registration Card" on one of the postage-paid postal cards appearing in this issue, and mailing it in.—Editors

High-Mounted Welders Save Space

A UNIQUE MOUNTING ARRANGEMENT for 6 welders saves space and keeps the welding equipment clean at the Huber Mfg. Co., Marion, Ohio. Mounted at a height of 8 ft, the



Two welders mounted on platform utilize "air rights" to save space. Shaft turns sheave, regulating welding current

welders are controlled by a pulley and shaft mechanism. The linkage enables mechanics to make welding current adjustments from the floor.

The novel setup frees floor space and protects the welding equipment from damage and dirt.

Elliptical Grooving Method for Plain Bushings Outlined for Machine Lathe

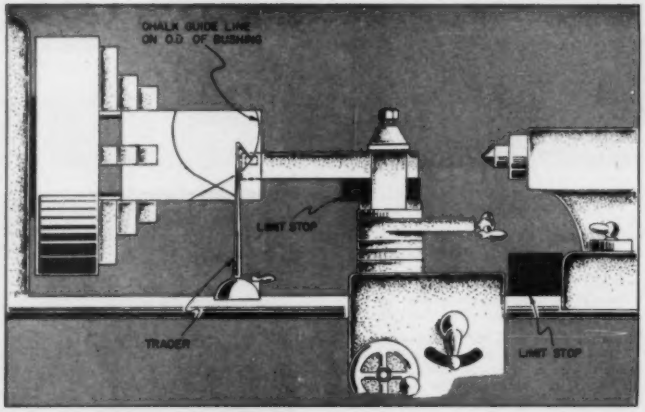
Contributed by Gerald Leonardy

THE ADVANTAGE of elliptical oil grooves in replacement bronze bushings over parallel or circular grooves is evidenced by comparison of the wear on shafts bearing on the various grooves. Two diametrically opposed elliptical grooves cut in a bushing tend to spread the lubrication, hence the wear, more evenly over the bearing surface. While the parallel and circular grooves may lubricate as efficiently, there is a tendency for these grooves to wear ridges in the shaft.

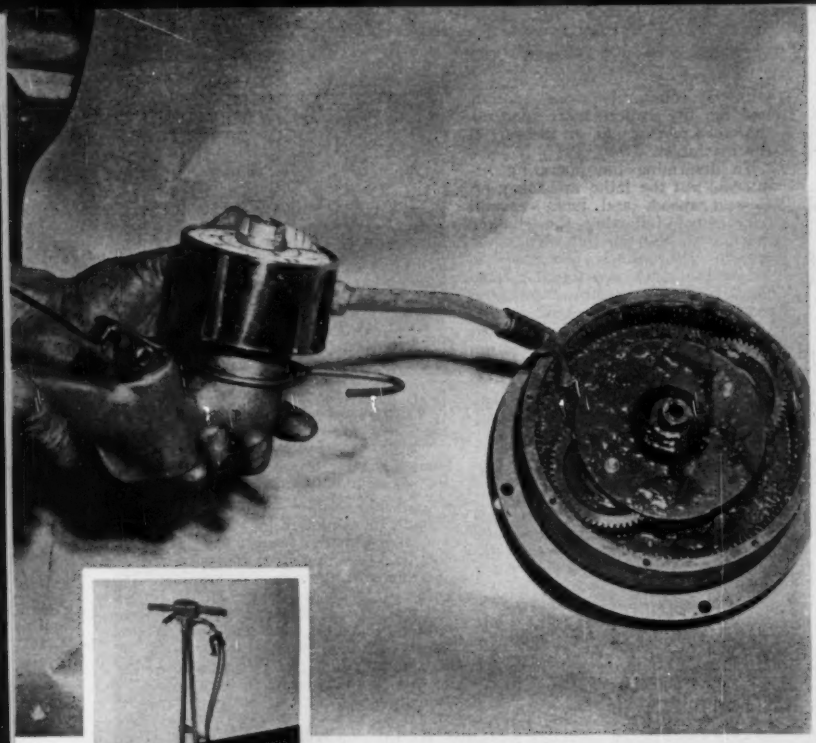
If a bearing groover is not available to mechanically lay out and cut elliptical grooves in replacement bushings, the following procedure can be followed on a machine lathe.

On a finished bearing, ready for grooving, chalk in the two groove limit lines, and two diametrically

(Continued on page 52)



Sketch shows position of tool bit, work piece and carriage stops for grooving



Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Doub is the Standard Oil lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

STANOIL Industrial Oils.—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

OPERATION & MAINTENANCE

(O and M begins on page 50)

opposed lines on the outside of the bushing. Rotating the piece in the lathe by hand, outline a figure 8 on the outside of the bushing, within the limit lines.

Extend the lathe boring bar, fitted with a grooving tool bit, beyond the V block on the tool post a distance equal to the proposed longitudinal length of the groove. By limiting the travel of the boring bar into the bushing, the left stop is established. To establish the right stop, move the tool bit to the right groove limit, and move the tail stock up against the carriage. Install a spacer for working clearance if necessary, and lock the tail stock in place to prevent overtravel of the tool to the right.

By replacing the tool bit in position to make the cut on the rear of the bushing, tool withdrawal is done with a counterclockwise motion, making the action more natural, therefore more rapid, on the part of the machinist.

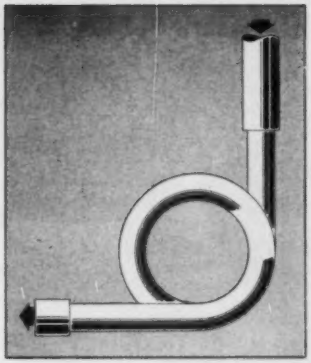
To determine the operating sequence, put the lathe in back gear, slowest speed, and make several "dry runs" following the chalked mark with the tool bit. When the mechanical motions necessary to follow the mark are familiar, feed the tool in at the right extreme, and make a cut across the bushing and back to the starting point. Repeated cuts give the groove the required depth, and at the same time increase the operator's efficiency in following the mark to make a satisfactory elliptical groove pattern.

Bent Tubing Forms Fluid Trap

Contributed by John L. Brown

IN A LARGE automobile manufacturing plant, an overhead automatic measuring device is used to measure an accurate amount of lube oil for each new car.

It was found that some cars were getting far too much oil, while others were being incompletely filled. Investigation of the system revealed that the trouble lay in the long hose leading from the measuring device to the car. This hose was inserted into the engine, and the device turned on to complete its filling cycle and shut itself off. At times, however, the hose drained, too, thus giving an overage equal to the hose volume to that particular car, while the next one was short.



Simple circular trap formed from tubing and inserted into line stops drainage

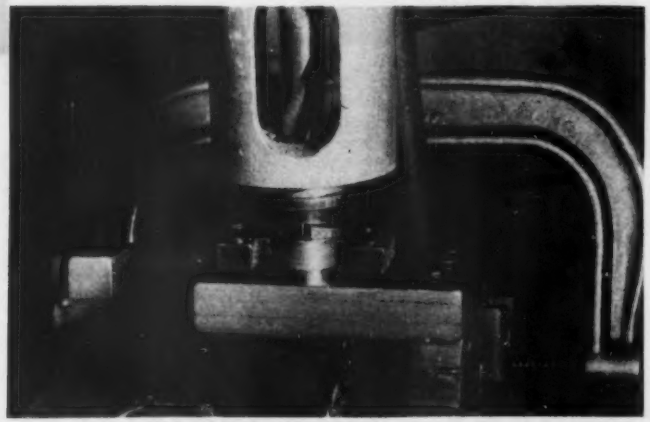
A trap, formed from a piece of copper tubing, solved the problem. Now, regardless of the position of the hose, air cannot get up past the circular trap, to allow the oil to drain.

Adapter Holds Drills in Place for Accurate Drilling

A NEW TYPE ADAPTER for locking Keller air drills in place when drilling large (.75 to .875 in.) holes in hardened steel has speeded drilling operations at Temco Aircraft Corp., Dallas, and at the same time has made these operations safer and more accurate.

The adapter employs two sets of hardened steel lugs, replacing the lug and set screw combination formerly used. One set of lugs is welded to opposite sides of the adapter and the other to opposite sides of a liner bushing attached to the jig. The top surfaces of the lugs on the adapter are ground at an 11 degree angle, and the bottom surfaces of the lugs on the liner bushing at a corresponding angle in the opposite direction. When the drill is inserted through the bushing in the jig, a counterclockwise turn of the drill motor locks the two sets of lugs together, and when the drill touches the work, the torque of the drill housing forces the lugs tighter.

The adapter has proved to be superior for all Keller air drill operations. It provides a firmer union, reduces drill wobble and permits holes to be drilled to much closer tolerances. Another advantage is that holes can be drilled from the bottom of a piece of material without turning it over.



Air drill adapter partially inserted into jig. Lugs lock drill tight against jig frame

Truck Drivers Need Training

THE COST OF NOT TRAINING industrial truck drivers is many times the price of a proper program of instruction.

According to J. L. Van Cara, driver-training expert of the Automatic Transportation Co., Chicago, current training of industrial truck drivers, except in the largest firms, is poor.

Before he ever gets onto the truck, the new operator should understand its functions, abilities, limitations, and capacity. He should know where the controls are and how they work.

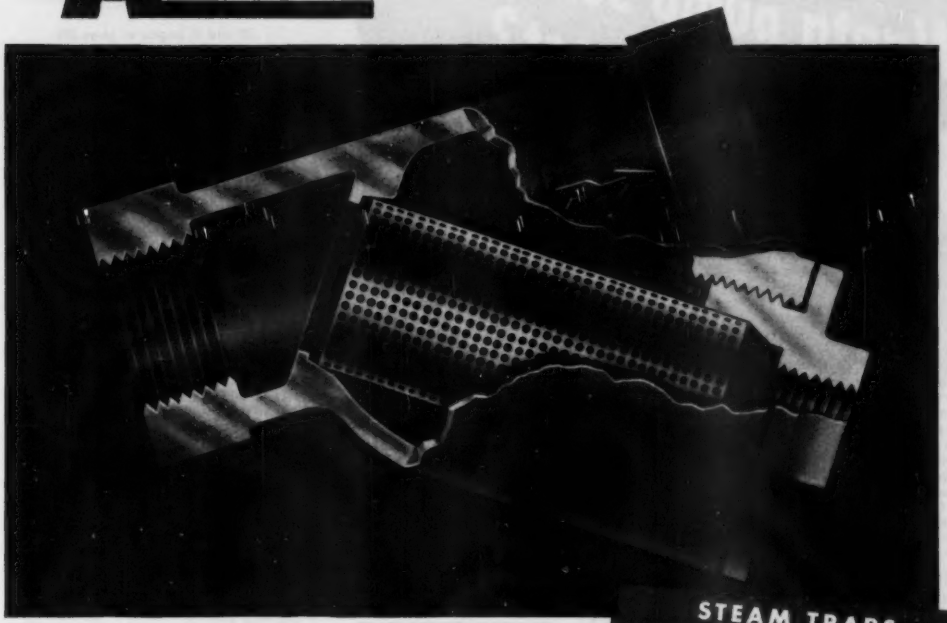
If possible, drivers should be instructed over a 3-day period, the first day largely spent in practicing alone with an unloaded truck. During this day, the trainee will learn controls, speeds, and smoothness of operating.

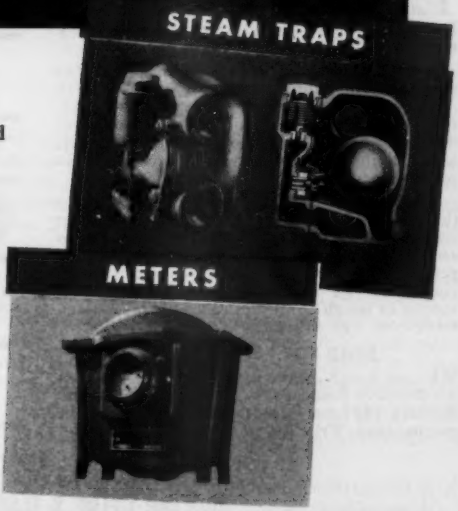
The next day he should begin to use a typical load, and gradually begin working into the area where he will be assigned. He should learn traffic problems, the speed at which he'll work, and where he picks up and delivers loads. Also, he should get the feel of working in the limited space of storage bays.

The third day he'll be on his own, most of the time, and before his shift is over he should be at ease.

The following 17 points are con-

ADSCO Y-TYPE STRAINERS





Protect regulators, pumps, valves, and traps with ADSCO Y-type Strainers. They remove dirt, scale, and other foreign matter from steam, gas, air, water, and oil lines . . . before the dirt reaches equipment. Maintenance thus is reduced and costly shutdowns prevented. Screens in ADSCO Y-type Strainers have free opening area 2 to 8 times greater than inside area of pipe. The gasketed cap and tapered fit for screens guarantee a uniform, snug fit. Pressure drop through strainers is no greater than an ordinary elbow. Write for Bulletin 46-50B.

ADSCO
75 YEARS OF LEADERSHIP

AMERICAN DISTRICT STEAM COMPANY, INC.
NORTH TONAWANDA, NEW YORK

For more facts circle 540 on Reply Card

Wanta pump something at lower cost?

CHECK HERE

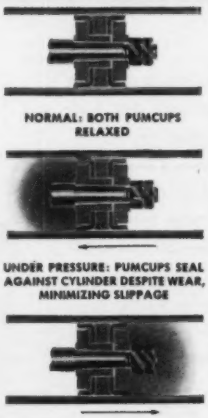
Air	Dye Solutions	Latex	Salt Water
Alcohol	Edible Oils	Mash	Shortening
Ammonia	Ethane	Methane	Sludge
Beer	Fish Oils	Milk	Soap
Benzol	Formaldehyde	Molasses	Sodium Chloride Solution
Boiler Feed Water	Fresh Water	Naptha	Sodium Silicate
Brewer's Mash	Gas, Manufactured	Nitric Acid	Sodium Sulfate Solution
Butter	Gas, Natural	Nitrogen	Starch
Butane	Gasoline	Oil, Crude	Sulphuric Acid
Cane Syrup	Glucose	Oil, Refined	Sump Water
Calcium Carbonate Slurry	Glue	Oxygen	Sweet Water
Calcium Sulfate Slurry	Glycerine	Paint	Tomato Juice
Casein Solutions	Glycols	Potassium Hydroxide	Varnish
Cement Slurry	Hydrochloric Acid	Propane	Vinegar
Chocolate	Hydrofluoric Acid	Raw Boiler Feed Water	Viscose
CO_2 Gas	Ink	River Water—Dredging Operations	Water (various)
Crude Oil	Jam	Rosin	Wax
Dairy Products	Jelly		Whey
	Ketchup		
	Lacquer		

THIS list of fluids will give you a rough idea of the diversity of pumping jobs in which Darcova Pumcups are responsible for really *big* savings.

It boils down to the fact that Pumcups all but eliminate fluid slippage *throughout* their life span . . . and they *last many times as long as other packings.* Think of the down-time avoided, the production gains due to prolonged high efficiency, and the time-and-money-saving reduction in maintenance!

Years of application research have gone into the development of Pumcups. Made today in standard as well as many special compositions and textures for a wide range of temperature and pressure conditions, they offer you superior cost-cutting service in virtually *any* pumping job, simple or tough! And they're available in diameters from 1 to 20 inches.

DIAGRAM OF DARCOVA PUMCUP ACTION (greatly exaggerated)



NORMAL: BOTH PUMCUPS RELAXED

UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE

SEND FOR FREE BULLETIN

Why not weigh *all* the facts? Bulletin 4401 covers Darcova Pumcups for reciprocating pumps; Bulletin 4502 on Pumcups for air or hydraulic mechanisms. Write for yours today.

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 14, PA.

DARCOVA — THE ORIGINAL COMPOSITION CUP — PUMCUPS

For more facts circle 541 on Reply Card

OPERATION & MAINTENANCE

(O and M begins on page 50)

sidered an excellent basic code for any company's industrial truck operators:

1. Keep the body inside running line of the truck.
2. No passengers should be permitted to ride on the trucks.
3. Keep to right of aisles whenever possible.
4. Slow down when vision is obstructed.
5. Stop at doors, corners, exits, etc., and sound horn.
6. Use horn when approaching pedestrians.
7. Start, stop, or turn gently, not suddenly.
8. Face in the direction of travel always. Before backing up, look in the direction you will go.
9. Carry only loads for which the truck is meant.
10. Keep loads below eye level, carrying them just clear of the floor. If the load blocks vision, it should be trailed except on sit-down model trucks (a problem which can be avoided by selection of the correct truck for the load).
11. Never drive high lift trucks with platform or forks elevated.
12. Bent or damaged loading plates should not be used.
13. Reverse controls are not a substitute for brakes.
14. Driving with wet or greasy hands is dangerous, because it can cause the operator to lose control of the wheel.
15. Slow down for wet or slippery floors.
16. Stunt driving and horseplay should be eliminated.
17. Trucks should be returned to the charging station or parking area at the end of the shift.

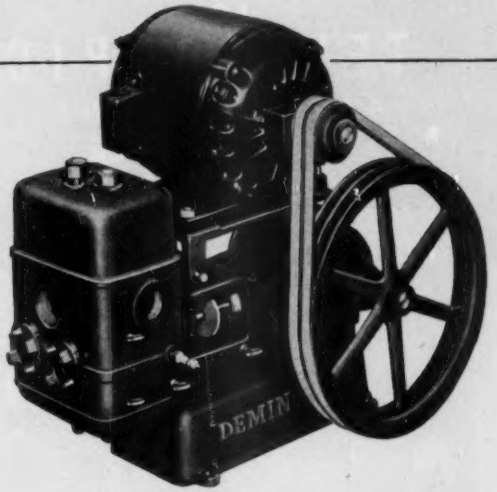
Handy Tape Records Fluorescent Tube Life

EVEN IN A SMALL PLANT, fluorescent tube replacement can run into a lot of money. It is often worth while to check tube life, to confirm the economies of fluorescent lighting, or to determine the most efficient type for a given set of conditions. Another reason for checking tube life is involved in the practice of "group replacement" of all tubes in a room, department, or floor at the same time. This practice is based on the theory that it is cheaper to replace all the tubes at one time (even though each tube may have a few hours of illumination left) than it is to replace individual tubes as they burn out.

It can also be considered sound business to check on tube life when-

teamed for top performance!

Deming Water Pumps and Gilmer V-Belts



Deming Duplex Pumping Unit, like other Deming reciprocating pumps, is originally equipped with GILMER V-Belts for long, trouble-free service.

Private water systems—such as those manufactured for more than 70 years by The Deming Company, Salem, Ohio—supply running water to millions of suburban homes and farms. Users demand that their operation be quiet, dependable, require little or no attention. That's why Deming has, for years, equipped its belt-driven water pumps with GILMER V-Belts!

And Deming is only one of many such leading machinery manufacturers who entrust the reputation of their products to GILMER V-Belt drives. Certainly, here is evidence of the most convincing sort that designers, engineers, men who know drive requirements best, recognize the fundamental soundness of GILMER V-Belt design . . . the uniform quality of GILMER V-Belt construction.

Take a tip from these men whose business it is to know V-Belt performance and V-Belt value. Start now to standardize on GILMER V-Belts!

These top-performing V-Belts and other famous GILMER products are now available through your NYB&P Distributor. He is ready and eager to provide you with the best in belts . . . the best in service!

Our Second Century of Service to Industry

NEW YORK BELTING & PACKING CO.

America's Oldest Manufacturer of Industrial Rubber Products

1 MARKET STREET—PASSAIC, NEW JERSEY

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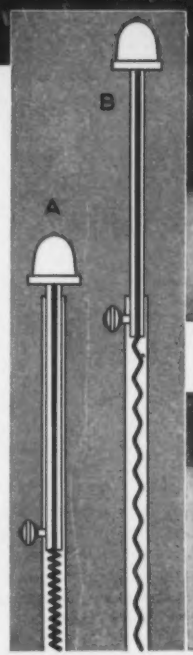
Koiled Kords

FOR

T-E-L-E-S-C-O-P-I-C

APPLICATIONS



Extending feature of Koiled Kords makes it possible for the light to be raised to afford greatest visibility and protection.

Line drawings show position of Koiled Kord (A) retracted and (B) extended within light standard.

Normal position of light is snugly fitted to top of car. In this position, the Koiled Kord is retracted within the standard.

The telescopic emergency lights made by McDonald and Arneson, Vallejo, California, demonstrate an interesting application of the expanding and retracting abilities of Koiled Kords.

In this case, by the use of a combination of straight and Koiled Kord, one tube can telescope within the other without interference from the cord which is contained in the outer tube.

Write for illustrated bulletin showing many uses for Koiled Kords.

*TRADE MARK

Koiled Kords INCORPORATED

BOX K,
HAMDEN, CONNECTICUT

For more facts circle 543 on Reply Card

OPERATION & MAINTENANCE

(O and M begins on page 50)

Photo: Labelon Tape Co., Inc.

Tape strip attached to fluorescent fixture provides record of installation date

ever specific guarantees are given, since adequate records can prove that fluorescent tubes did not last through the guarantee period.

One of the simplest methods of checking tube life stems from the use of a pressure-sensitive type tape. This tape can be written on with any pointed instrument, since the pressure of the instrument alone causes the writing to appear.

The tape can be applied in short strips to lighting fixtures when new tubes are installed. A permanent record of the installation is thus made, yet it can be removed and replaced at any time to record the installation of new tubes.

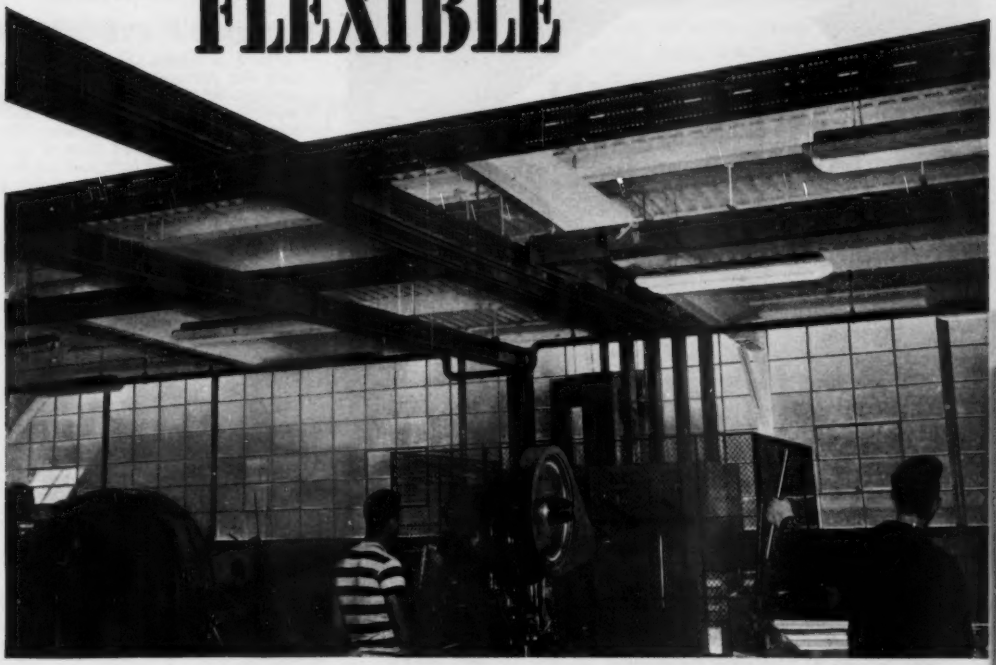
Production Welding of Aluminum

THE RAPID EXPANSION of the use of shielded-arc welding is the subject of wide industrial interest, due

Photo: Air Reduction Co., Inc.

Welder checks operation of welding head as it moves along aluminum seam

BUS DUCT IS FLEXIBLE



"It's So Flexible To Plant Layout..." says The Randall Company

The Randall Company officials stated, "It's so flexible to plant layout and production line shifts that it's just what we need for future changes and expansion."

"The ease of installing your Bus Duct was amazing . . . it saved us both time and money," said the contractor, Mr. Edward P. Fogarty, President of Fogarty Electric Company, Cincinnati, about this job.

This large installation of Westinghouse Low Impedance and Plug-In Bus Duct is in the Randall Company plant at Wilmington, Ohio. It is assembled from standardized sections that allow rapid dismantling and reassembly without waste of time; duct is fully salvageable.

Up to 5,000 amperes, Westinghouse Bus Duct provides more power per pound of equipment than any system of wireway, cable or conduit. Four types are available to handle all load requirements, meet all service conditions in your plant or building from power source to outlet.

Get complete facts by calling your Westinghouse Distributor or write for B-4272-A, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-30108

For more facts circle 544 on Reply Card

HERE'S HOW

to simplify your heating problem

with....

SHAW-PERKINS

CONVECTOR-RADIATORS

Photo shows a ceiling installation of Shaw-Perkins convector-radiators in a large manufacturing plant.

LOW PRESSURES NOT REQUIRED—SP Radiators operate at pressures up to 150 psi. Heat emission rate increases with pressure.

NO EXTRA PIPING—SP Radiator units can be connected directly into process steam lines. No separate supply and return system needed.

EVEN HEAT—NO AIR BLAST—High heat output. No blowers needed. Smooth, even heat with no forced circulation.

BETTER DRAINAGE — Straight flow of steam with positive pressure differential makes condensate drainage traps work very efficiently. Sediment doesn't settle in unit. Annual cleanout not required.

SAFE! Hydrostatically tested at 3,500 psi.

LOW SURFACE TEMPERATURES—No hazard to personnel.

USES NO FLOOR SPACE—Small, light weight, compact, mounts ideally on ceiling or walls.

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Company .....
Address .....
City ..... State .....

SP Specialists in INDUSTRIAL HEATING Since 1927

For more facts circle 545 on Reply Card

OPERATION & MAINTENANCE

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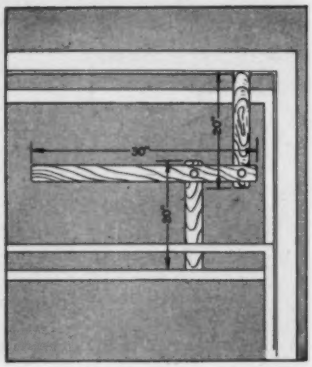
in part to the high production speeds available.

The J. S. Thorn Co., Philadelphia, uses the Aircomatic head on their production welding equipment to weld 15-ft seams in 3/16 in. aluminum at 100 in. per minute. The filler wire is supplied from a mechanical wire-feed unit, and no flux is required with helium shielding gas employed.

The welding head is run on standard track, aligned with the seam.

Window Tool

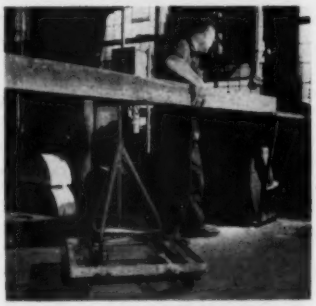


Easily-made tool provides leverage for opening stuck window sash. Steady force applied to long arm is more effective than striking sharp blows on sash

Tripod Moves on Wheels

Contributed by Herman Goelz
Allis-Chalmers Mfg. Co.

SKID MAKERS in the mill shop are often required to cut heavy timbers on bandsaws. Formerly, a station-



Tripod moves with timber as carpenter pushes it against saw without lifting

ary, adjustable-height tripod was used to hold the free end of the timber. This did not prove too satis-

No Pressure Wipe-Off on Gears Lubricated with Sun 897 Grease

Even heavy tooth loading won't cause Sun 897 Adhesive Pressure Grease to squeeze out. It stays on the gears, prevents metal to metal contact, prolongs gear life, and reduces lubrication costs. Sun 897 is most valuable where *throw-off* with resultant wear and spotting of products must be avoided. It is easily applied with a brush on open gears, sprockets, chains, slides, cams, cables, couplings and linkages. For complete information, consult your nearest Sun representative or write Department PY-12.

SUN INDUSTRIAL PRODUCTS
SUN OIL COMPANY • PHILADELPHIA 3, PA.
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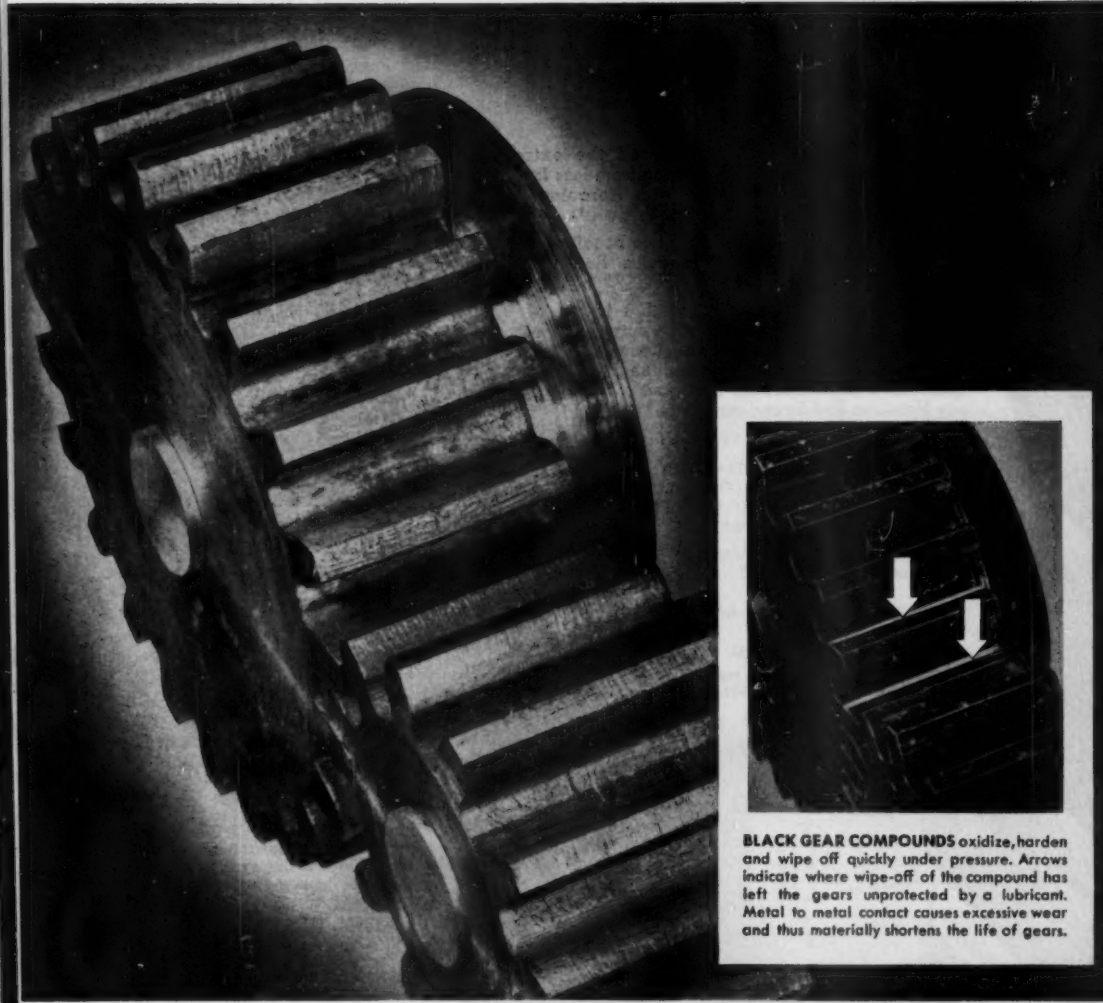

BLACK GEAR COMPOUNDS oxidize, harden and wipe off quickly under pressure. Arrows indicate where wipe-off of the compound has left the gears unprotected by a lubricant. Metal to metal contact causes excessive wear and thus materially shortens the life of gears.

NO SQUEEZE-OUT due to pressure. A thin, transparent film of Sun 897 Adhesive Pressure Grease stays evenly distributed on the gears and gives positive lubrication at all times. Sun 897 is water resistant and can be easily applied with a brush.

Are you getting these

Bonus Benefits

of Red-Strand wire rope

QUALITY?

Does your present wire rope *deliver top tonnage?*

Have you considered the extra *labor-savings* resulting from less frequent replacement with Hercules* Red-Strand?

Do you know that these two benefits are top ones with Hercules Red-Strand wire rope users?

Are you getting wire rope that is manufactured with the precise care . . . the exacting insistence upon *higher-than-rated* quality . . . and the specialized craftsmanship that goes into Hercules Red-Strand wire rope?

If you're not sure . . . FIND OUT

It means money to you. Leschen wire rope specialists will help you answer these questions . . . to your profit. There's no obligation. Ask them.

Write for your free copy of "Use and Care of Leschen Wire Rope."

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In business only to make wire rope — better wire rope — since 1857.

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Preformed • Round Strand • Flattened Strand • Non-Rotating • Locked Coil • Slings

For more facts circle 547 on Reply Card

OPERATION & MAINTENANCE

(O and M begins on page 50)

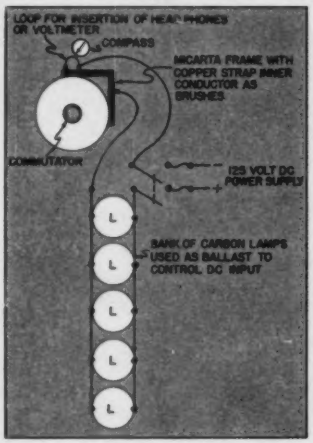
factory, however, because the one end of the timber had to be lifted when pushing the other end into the saw.

To improve the operation, casters which can be locked in position have been placed on the tripod. Now when movement is required, as when cutting radii and long splices, the tripod can be easily shifted.

Improvised Tester Uses Compass

Contributed by Paul C. Ziemke

PRESSED INTO USE on an emergency locomotive armature testing job, an improvised brush arrangement,


LOOP FOR INSERTION OF HEADPHONES OR VOLTMETER
COMPASS
MICARTA FRAME WITH COPPER STRAP INNER CONDUCTOR AS BRUSHES
COMMUTATOR
125 VOLT DC POWER SUPPLY
BANK OF CARBON LAMPS USED AS BALLAST TO CONTROL DC INPUT

Improvised brush arrangement as used to test polarity of commutator windings

coupled with a compass, served to good advantage. The testing was necessary to determine the cause of a "jump" in the armature as it rotated in the motor, under test load.

With the armature removed and set in a test stand, and current being fed into the windings as shown on the diagram, the armature was slowly rotated, with the compass held near the windings. A sudden reversal of the compass needle, indicating a reversal of flux polarity, pin-pointed a transposed coil, responsible for the armature "jump" that had been occurring.

Conveyor Safety Rules

TEN BASIC SAFETY RULES in the operation of conveyors outlined by Jervis C. Webb, Executive Vice President and General Manager of the Jervis B. Webb Company, Detroit, are:

1. Never put a conveyor system

What to look for in a safety switch

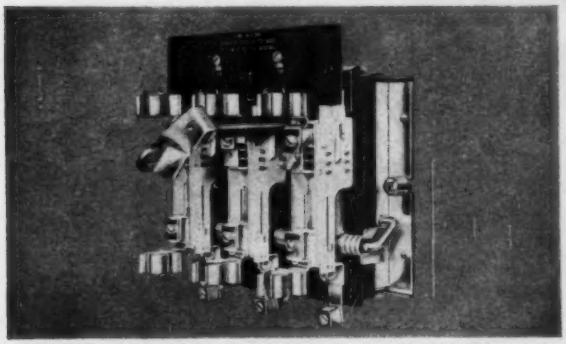
- **Maximum protection for electric circuits and personnel**
- **Ease and flexibility of installation**
- **Convenient and safe maintenance**

A modern, top quality, heavy-duty industrial safety switch *should* fulfill these requirements . . . but what are the design and construction features that make certain that it *will?*

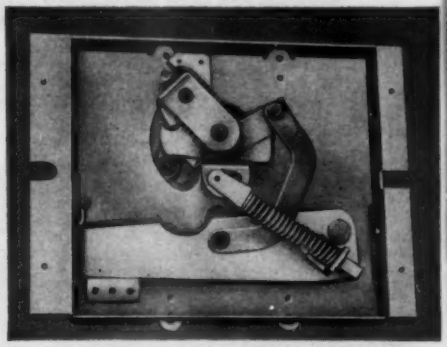
Let's take a close look at the front-operated HCI switch*—Trumbull's best—and check its features point by point.

**Meets NEMA types 1 and 1A specifications.*

1. START ON THE OUTSIDE—*THE ENCLOSURE.* Made of heavy gauge steel, specially treated and then coated with high-baked enamel for corrosion resistance. That *handle* is important, too. It has a releasable interlock for use of authorized inspectors only and will take three padlocks. The *cover latch* may be locked independent of the handle so the switch can be operated but not tampered with. The front is provided with a gasket, making the enclosure semi-dust-tight. Inside there's ample room for wiring—and plenty of *knockouts.* Three mounting holes make possible easy leveling and allow mounting on uneven surfaces.



2. REMOVE THE *INTERIOR UNIT.* Just loosen two screws and the whole interior slips out. The *pole units* are self-contained for easy removal without disconnecting wiring and use *silver-plated current-carrying parts . . . arc-resisting, linen-melamine insulating parts.* U-shaped *movable conductors* bring gap between line and load contacts to less than ½ inch reducing possibility of arc damage. Exclusive design of *pole units* and *contacts* take advantage of magnetic repulsion principle to give maximum arc-quench and contact bind (look further into this feature; it's the key to the long life expectancy of the Trumbull HCI).



3. BE SURE TO STUDY *OPERATING MECHANISM.* Underside of the HCI interior shows this operating mechanism which is protected by a riveted *cover plate.* It uses a *roller-cam action* and a multiplying *linkage* design with a powerful *spring* that always throws to full OFF or ON. No halfway position because there's no dead center.

Write for full data on Trumbull top quality, heavy-duty industrial safety-switch line—the HCI. Ask for Bulletin TEC-10.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY

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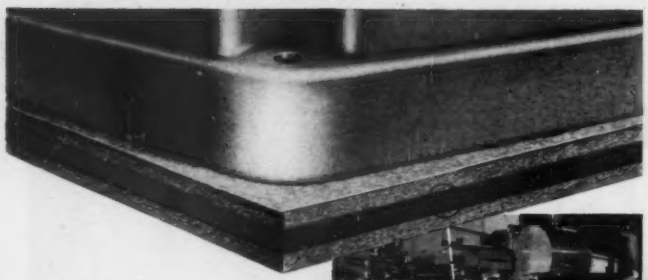

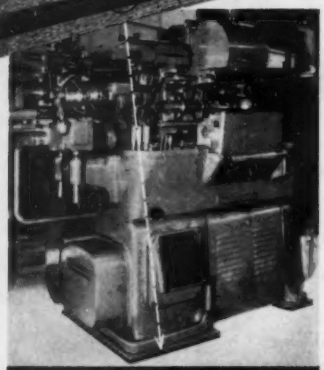

Brown & Sharpe Model 00-G Screw Machine mounted on UNISORB at Telechron, Inc., Worcester, Mass.

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Old-fashioned bolt-and-lag-screw methods of machine mounting . . . costly, inefficient . . . are *gone for good* when you mount machinery on UNISORB.

What's more, by eliminating 60-85% of transmitted vibration and noise, UNISORB prolongs life of machinery, building and floors . . . improves worker morale and efficiency . . . often permits higher machine speeds and increased production.

We supply a special cement that securely bonds UNISORB pads to machine feet and floor with a holding strength of at least 90 lbs. per square inch.

UNISORB is also available pre-coated with adhesive, but is not recommended for use with machines that require shimming.

You Reduce VIBRATION NOISE MAINTENANCE

with UNISORB Mountings

- no bolts, no lag screws, no holes to be drilled, no floor damage
- Felters adhesive holds for keeps, yet permits re-positioning of machines. (Our UNISORB Booklet tells you how.)

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For more facts circle 549 on Reply Card

OPERATION & MAINTENANCE

(O and M begins on page 50)

into operation until it has formally been turned over by the manufacturer.

2. Be sure drive machinery is guarded.
3. Keep lubrication piped to safe points.
4. Provide adequate clearances for maximum loads.
5. Consider visibility in locating controls and in loading.
6. Confine operation of conveyors to authorized employees.
7. Leave repair to maintenance employees.
8. Provide a smooth cover under slat conveyors to avoid shearing.
9. Insist on no riding and no stepping on conveyors.
10. Instruct employees in loading —to consider clearances, visibility, protruding hazards and danger of tumbling.

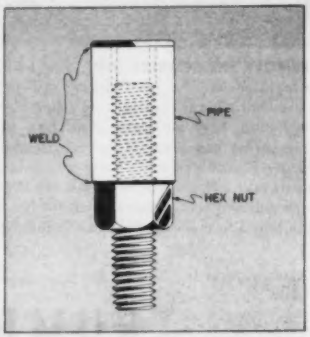
Welded Cap Nut Protects Threads

Contributed by Joseph J. Phillips Allis-Chalmers Mfg. Co.

A SIMPLE METHOD of protecting threads from paint has been devised in the power transformer radiator painting section, Pittsburgh Works.

In the process of closing the radiator openings for bonderizing and painting operations, the cover plates are temporarily held in place with bolts. These bolts become fouled with paint, and their usefulness is limited to 3 or 4 process cycles. The protector, which covers any exposed threads, greatly prolongs the life of the bolt.

Similarly, a solid rod can be drilled and tapped to receive the bolt, and radially drilled for the insertion of a rod as a T-handle to tighten the cap nut thus fabricated. In this case, welding the cap to a standard hex nut is optional.



Cap fabricated from pipe and plate is welded to hex nut to protect threads

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- **INCREASES PLANT CAPACITY AND PRODUCTION**
- **REDUCES HANDLING COSTS, DAMAGE AND LOSS**

American MonoRail Engineers can show you how to get more profitable production out of your plant by systematizing material handling. Let them show you how to convert lost ceiling space to profit—how to eliminate obstructive storage around machines—lessen worker fatigue—reduce heavy load accidents—stop damage to product in motion.

Bring us your handling problems—American MonoRail can provide the equipment best suited to your needs.

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HALL PLANT-WIDE

Wherever water is used for industrial purposes, Hall Labs can help you utilize water to the fullest, with economy of operation. For water requirements of plants not yet built, Hall can investigate present and future needs for water used for boilers, condensers, process heat exchangers and process operations, and recommend quality and quantities of water needed. Hall Laboratories' Service begins with

WATER SUPPLY

Hall Labs studies sources; determines quality; considers quantity.

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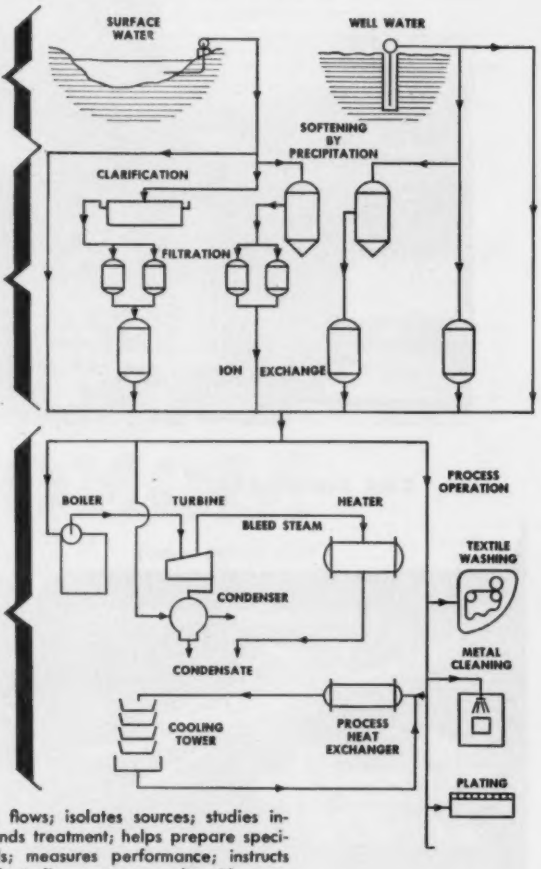
Hall compares alternative processes; helps prepare specifications and evaluate bids; sets up chemical dosages; measures performance; instructs operators; supervises control; solves special problems.

CONDITIONING FOR SPECIFIC USES

Hall prescribes chemical methods to

- **Prevent scale**
- **Control corrosion**
- **Minimize contamination;**

instructs operators; supervises control; solves special problems.



WASTE CONTROL

Hall Laboratories measures flows; isolates sources; studies individual problems; recommends treatment; helps prepare specifications and evaluate bids; measures performance; instructs operators; supervises control; studies re-use; consults with regulatory boards.

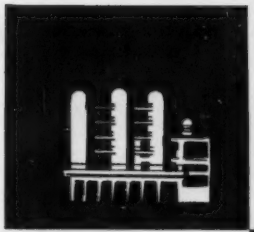
HALL LABORATORIES, Inc.

A Subsidiary of Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

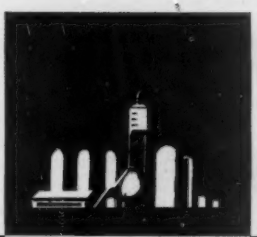
CONSULTANTS ON: Procurement, Treatment, Usage and Disposal of Industrial Water

WATER SERVICE

. . . for every industrial use of water. From supply to disposal, for process, boiler, and cooling waters, Hall Laboratories, Inc. can help you with Plant Water Management Problems.

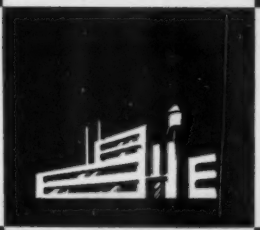


HALL studied problem of water supply, selected river intake point above tributary discharging acid wastes part of each year.

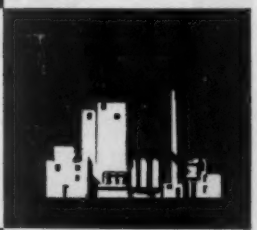


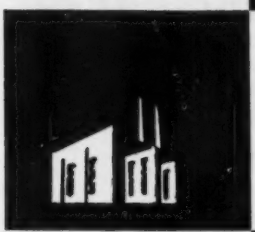
HALL stopped monthly shutdowns for scale removal by applying Threshold Treatment to condenser cooling water.

HALL and plant men identified gross contamination of boiler water in paper mill as starch, traced it to waste line connected to condensate return line.

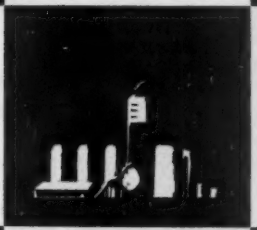


HALL helped chemical plant solve problem of sludge in boilers—an unusual sludge cleaned up by treatment with silicate.



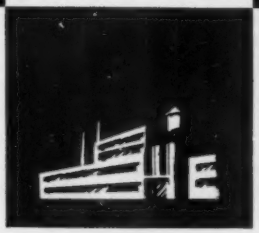


Successful conditioning of boiler water with potassium compounds, eliminating hide-out of dissolved salts, by **HALL.**

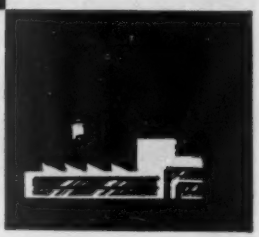


Over-all corrosion reduced more than 90%, pitting and accumulation of corrosion products in oil refinery heat exchangers eliminated by **HALL.**

Serious corrosion minimized in paper mill by control of white water system established by **HALL.**



Iron rust deposited on dyed material closed down dyehouse until iron pick-up in hot water system was controlled by **HALL.**



There are no "stock answers" to Industrial Water Problems. Hall Laboratories studies water problems with the plant personnel concerned, and recommends procedures which take all factors into account, to give you the *best and most economical solution for your problems.*

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HERE'S WHAT WE MEAN—

ABOUT DRACCO "KNOW HOW!"

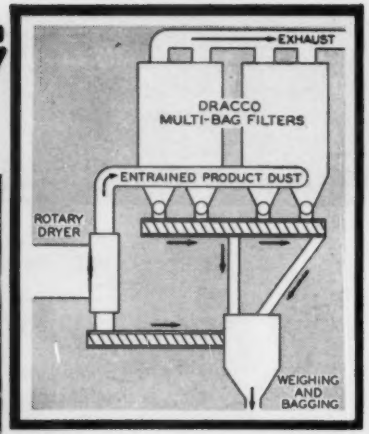
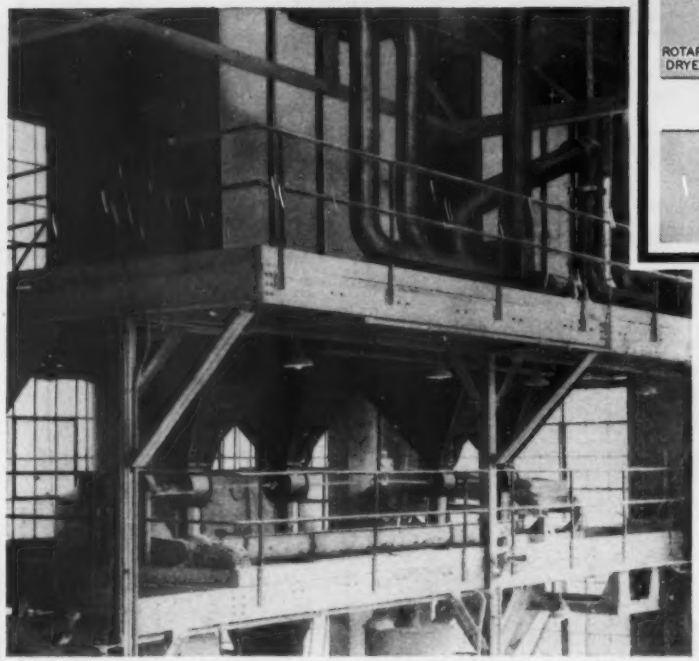


Diagram illustrates how Dracco units prevent costly loss of product in exhaust and move all product to weighing and packaging.



Air blast through rotary drier entrains product chemicals which are captured and recovered by Dracco Filters.

"Know-how"—at Dracco—is more than a "catch phrase"—it's the result of many years' experience in solving all types of dust control problems.

The importance of Dracco "know-how" to users of Dust Control Equipment is demonstrated by this case of a producer of organic chemicals.

This company employs a manufacturing process requiring the recovery of product dust from a drying operation. Former equipment was unsatisfactory in operation.

Dracco engineers were called in to solve the problem. They conducted a thorough engineering survey which resulted in a custom-engineered installation of Dracco equipment *exactly* fitted to this customer's needs. Dracco units proved successful immediately, and have since provided trouble-free, essentially 100% product recovery.

If you have a *tough* dust control problem, you can rely on Dracco "know-how" to produce a profitable, "Performance-Proved" solution. It will pay you to get it done right the first time—by Dracco.

Call or write in for a Dracco Engineer—there is no obligation.

DRACCO CORPORATION

Harvard Ave. and E. 116th St. • Cleveland 5, Ohio

Write for Bulletin 529 and the Dracco Engineering Data Sheet which will simplify an analysis of your dust problem. Address Dept. P-12, Cleveland 5, O.

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Standardized FA SWITCHBOARDS

Standardized FA Switchboards are noted for their safety, efficiency, dependability and economy of operation.

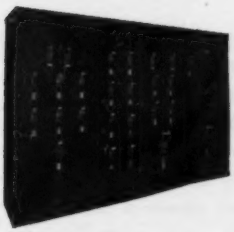
The result of more than 60 years of manufacturing experience, these sturdy, long-lasting and trouble-free power centers embody all the latest features in design and operating units to assure maximum service.

Standardized FA Switchboards are of three types—The Shutlbrak, a safety-type switchboard designed for frequent operating use; the Klampswitchfuz, which features a dependable hinged type, pull-out switching unit for disconnect service on lighting and power circuits, and the Circuit Breaker, another safety type featuring the latest developments in automatic circuit protection for main and branch feeder circuits.

All are built from standardized, pre-assembled units. This flexible system of assembling complete sections and units into standardized enclosures not only provides all the advantages of "tailor-made" switchboards but affords substantial savings in cost.

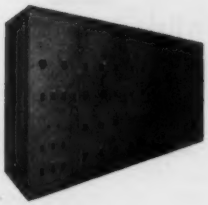
All standardized FA Switchboards are factory-assembled and shipped ready for connection to main and branch circuit cables. Units can be arranged singly or grouped, because all sections readily fit together. Removable end walls permit the addition of sections on either side. The number and capacity of switches are supplied according to specifications.

Want to know more about these efficient, long-lasting power centers? Your nearest FA representative listed in Sweets, will be glad to give you complete information.



FA SHUTLBRAK
30 to 1200 amps. 250 volts AC or DC and 600 volts AC.

FA CIRCUIT BREAKER
15 to 600 amps, 250 volts AC or DC; and 600 volts AC. For larger capacities air circuit breakers are used.



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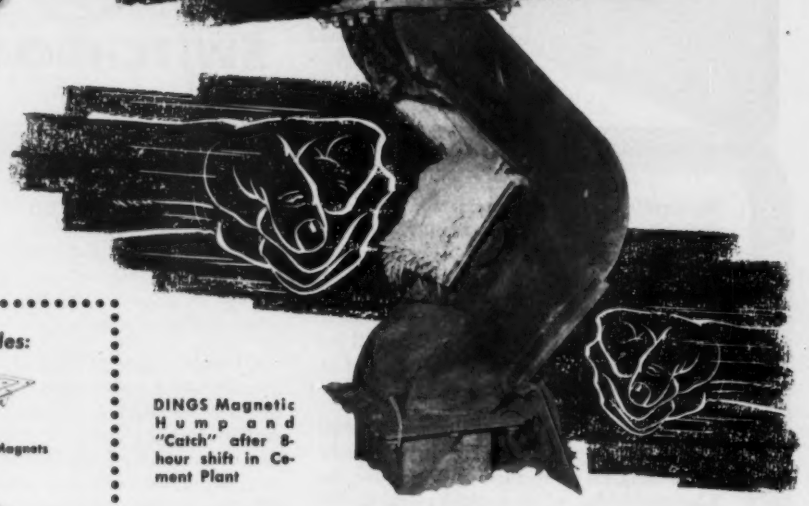
TRAMP IRON FIGHTER with a 1-2 PUNCH!

Note clean magnet face before 8-hour shift in Cement Plant



DINGS Magnetic Hump and "Catch" after 8-hour shift in Cement Plant

DINGS *line includes:*

DINGS Perma-Plate Magnets

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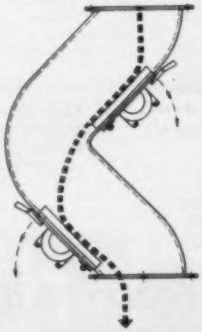
DINGS NEW RM Suspended Magnet. Most Powerful tramp iron magnet yet!

DINGS NEW Non-Electric Magnetic Hump!

HERE'S a worker who takes no time off for anything, whose strength never ebbs, who gives two-fisted tramp iron protection — guides your dry material flow over the face of *two* powerful Dings Guaranteed Permanent Alnico Magnets and sends it on its way free of iron.



If the material you process is granular, powdered or fibrous and flows through circular or rectangular chutes or ducts, a Dings Magnetic Hump flanged to fit into existing ductwork may be your "Man." But this is only one of DINGS complete line of magnetic separators. See some of the others, left — and consult Dings for the best *Job-Selected* magnetic tramp iron protection for *YOU*.

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4766 W. Electric Ave., Milwaukee 46, Wisconsin

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Ronald Chatham photo

With special test equipment, velocity of air flow within model is accurately measured.

Measuring man-made breeze to bring better air to school children

Room model and wind tunnel tests show what kinds of fenestration systems provide the best ventilation.

WITH MORE AND MORE schools using Insulux Glass Block® for better daylight distribution, Kimble Glass Company wanted to be able to recommend ventilation practices that would keep pace with this modern method of daylight control.

The Texas Engineering Experiment Station tested a wide variety of schoolroom designs to determine the best methods of ventilation when using an Insulux Fenestration System.

If schoolroom ventilation is a problem that concerns you, you'll want a copy of the test report. Just mail the coupon. And, if you don't yet have a copy of "Better Light for our Children"—the 24-page booklet that describes the advances being made in the field of schoolroom daylighting—just check that box, too.

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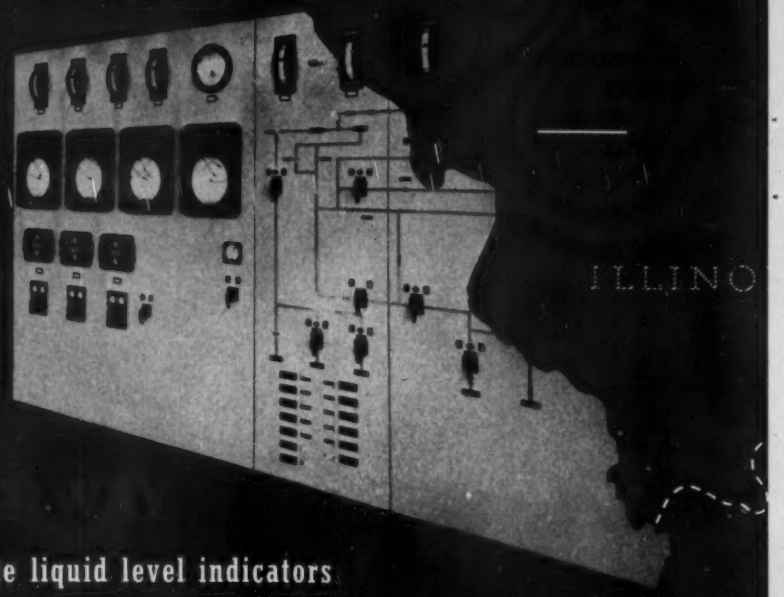

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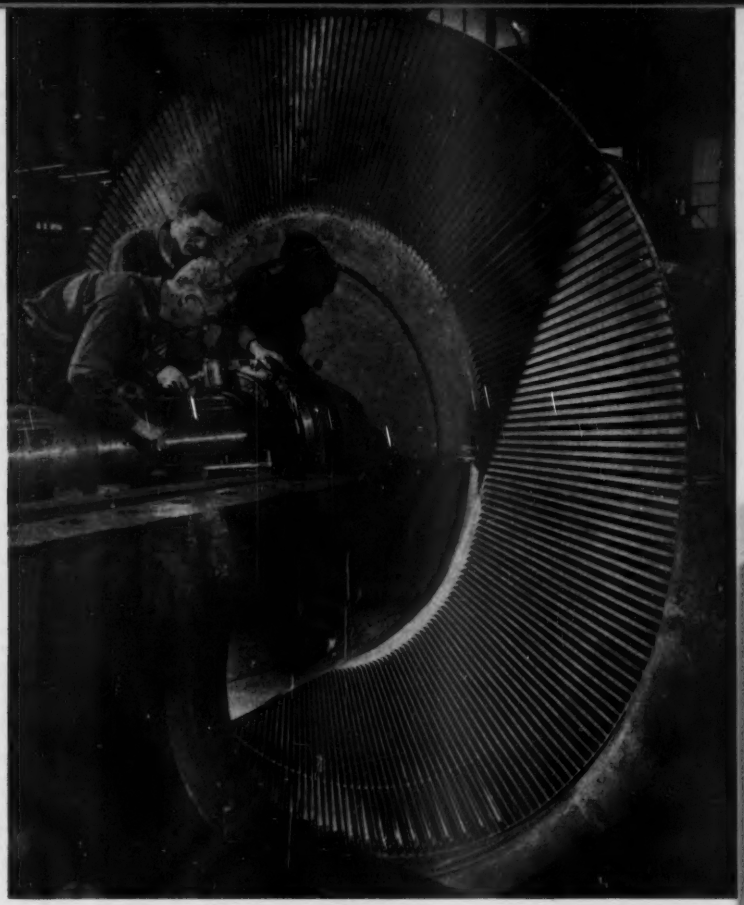


Trouble-shooting a turbine sleeve bearing. Checking clearance is an important lubrication analysis step

Don't Blame the Lubricant— CHECK THE LUBRICATION!

By BRUCE M. DUNHAM, Technical Consultant, Sun Oil Company, Philadelphia, Penna.

NINE TIMES out of ten when trouble is experienced with plain or sleeve bearings the lubricant receives the blame. And, as a matter of fact, nine times out of ten it is not the fault of the lubricant. But it is the easy way out to say, "The oil is no good!" Engineers who are faced with plain bearing failures must necessarily analyze the cause in a systematic fashion to arrive at a satisfactory solution.

The graphic "Trouble-Shooting Chart for Plain Bearings" has been compiled to aid in overcoming difficulties which may result from faulty operation or initially inadequate design of plain bearings. The major troubles including excessive wear, overheating, corrosion, fatigue, scoring or galling and seizures are listed together with the most common causes of these difficulties and their suggested remedies. At such time when any of these troubles are experienced, it may be convenient to check each of the causes under the particular trouble to attempt to determine the basic reason or reasons.

How to Use the Chart

The chart has been so arranged that when trouble is evident in any classification, those responsible for analyzing the difficulty may start with Cause No. 1 and follow each subsequent cause listed in sequence until the actual deficiency has been segregated. For example: Assume that excessive wear is occurring in a bronze bearing in which a hardened steel shaft is operating. To analyze the cause, first determine "Is there a sufficient supply of the proper lubricant?"; if so, then go to Cause No. 2. "Is the oil viscosity too light?"; then proceed to Cause No. 3, etc., until the actual cause or combination of causes is determined. Caution must be exercised not to stop before all causes listed are considered in order that all discrepancies have been taken into account.

Excessive Wear: Wear may be depicted as the continuous removal of metal during use from the surface of moving parts. Wear can take place between moving surfaces only if there is metal-to-metal contact. The purpose of a lubricant is to prevent such metal-to-metal contact. It will be noted that there are four ways in which the lubricant may be responsible for wear.

1. There may be a lack of or in-

sufficient supply of lubricant. In this case the type lubricant may not be responsible but rather the method and frequency of its application. In order to eliminate or reduce wear a sufficient amount of the correct lubricant, whether oil or grease, must be supplied to the bearing during its operation.

2. The oil viscosity may be too light. Here, the conditions of speed and load allow asperities of journal and bearing to touch one another continuously, the oil film not being thick enough to adequately separate the metal parts.

3. The oil may be too heavy. This being the case, the proper wedge is not formed to allow the oil to creep between the journal and bearing. This condition is more pronounced under high speed conditions.

4. A boundary-film condition may exist. This condition is sometimes referred to as incomplete or partial lubrication and occurs between journal and bearing when the oil film is of extreme thinness but yet capable of retaining its film structure under heavy pressure. It is most likely to occur at slow speeds and high pressures. To relieve this condition, straight mineral oils are compounded with additives of such chemical nature that they form adsorbed boundary films either by orientation of the polar compounds or by chemical reaction with the metallic surfaces to form complex organic salts of the metal. This film then reduces friction by its oiliness.

Design Is Important

There are some other contributing factors to lubrication as a source of wear, namely; 1. Improper method of application of the lubricant; 2. Excessive end-leakage of oil out of the bearing; and, 3. Excessively high temperature resulting in too thin an oil film. These factors should be taken into consideration in the original design of the equipment, otherwise modifications must necessarily be made to alleviate these faults. Oil containing abrasive contaminants tends to cause excessive wear. Therefore, every precaution should be taken to exclude such contaminants.

Most of the other causes of bearing and journal wear may be a direct result of inadequate design. Among these are unsuitable bearing metal, bearing metal thickness too great or metals used in bearings and journals which do not operate well together. Some bearing metals operate well with soft journals while others require hard journals. Tin-base babbitts, lead-base alloys and overplated copper alloys can operate with an ordinary soft steel shaft. Cadmium alloys demand a journal having a Brinell hardness of above 250. Copper alloys and aluminum alloys require journals of over 300 Brinell hardness. Bronze does not operate well with soft steel; however, it does work well with cast iron or hardened steel. Babbitt metal, soft brasses and cast iron will operate well with soft steel. The explanation is related in some manner with lubrication, but the practical selection of metals which will work well together is based upon operating data that have been collected over a period of many years by trial and error. Other causes attributable to unsuitable design listed on the chart are: 1. Too rough a surface finish on journal; 2. Length to diameter ratio of bearing too low; 3. Excessive unit pressure; and, 4. Incorrect oil grooving of the bearing. These deficiencies may be alleviated or corrected as shown under "Remedy" on the chart.

Journal Faults

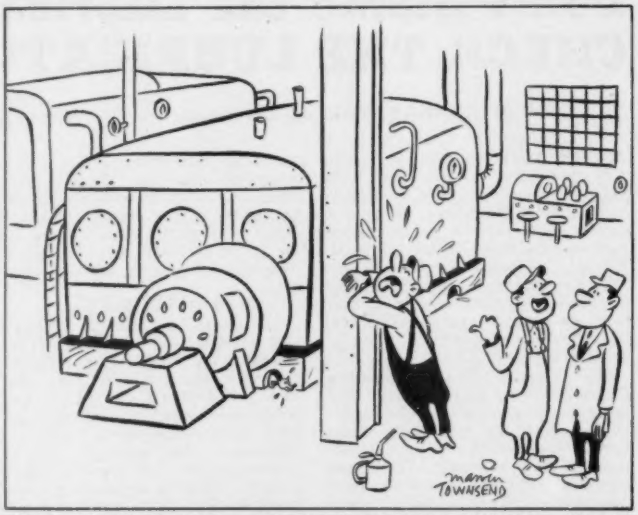
Misalignment of the journal, journal eccentricity and excessive journal deflection may be rectified by adopting the proper adjustments as required.

Overheating: Reference to the chart shows a number of causes of overheating of plain bearings. This is a common complaint which in the majority of cases can be remedied by performing the necessary modifications. When a bearing runs abnormally hot, it must first be determined whether the cause is mechanical or due to faulty lubrication. In the event it is a small bearing, the operator should first apply oil liberally. If it is a large bearing the total heat may be expected to be greater and generally the journal expands, lessening the clearance. Relief may be had by applying a compounded cylinder oil liberally. If seizure is evident, various remedies may be administered as discussed later under "Seizure." Overheating may sometimes be reduced by the application of oils containing polar compounds which lend greater oiliness characteristics, thereby reducing the coefficient of friction between the journal and bearing. Extreme pressure type oils also have been found to be effective in some cases. Sometimes changing from oil to a grease will rectify the condition. Where conducted heat is present such as in steam heated calender bearings, external cooling may be practical; but if not, a heavy bodied oil should be used to provide an adequate oil film.

Corrosion: Corrosion may result either from external corrosive type contamination or from lubricating oil breakdown. Corrosive acids may result from oil oxidation. This condition may be prevalent in cases where an oil is used for long time periods without change. Petroleum suppliers have substantially reduced this tendency by supplying high quality oxidation and corrosion inhibited oils. Where straight mineral oils are employed, operators should have them checked by the supplier from time to time to determine their suitability for continued use. Some extreme pressure type oils containing sulfur and/or chlorine may become corrosive in the presence of water and at high operating temperatures. Users should confer with their lubricant suppliers to make certain that E.P. type oils are noncorrosive for the operating conditions involved.

Fatigue Failure: Reference to the chart indicates the most common causes and remedies for fatigue failures. The subject of fatigue failures

(Continued on page 162)



"He just found out that every day for the past 5 years he's been oiling two mouse holes in that machine."

Trouble-shooting chart shows procedure for analyzing bearing faults. Investigation should follow the sequence as shown

TROUBLE	CAUSE	REMEDY
Excessive Wear	1. Lack or insufficient supply of lubricant	1. Supply greater amounts of lubricant
	2. Oil viscosity too light	2. Use heavier viscosity oil
	3. Oil viscosity too heavy	3. Use lighter viscosity oil
	4. Boundary-film condition	4. Use heavier oil or compounded oil or extreme pressure oil or grease
	5. Improper method of oil application	5. Install device to supply adequate lubricant
	6. Excessive end-leakage of oil	6. Supply more oil; install adequate seals
	7. Excessive temperature resulting in too thin an oil film	7. Lower operating temperature by cooling; use heavier viscosity oil
	8. Unsuitable bearing metal	8. Replace with metal of proper composition
	9. Bearing metal too thick (Babbitt)	9. Use thinner bearing metal
	10. Metals in journals and bearings which do not operate well together	10. Change bearing or journal. If journal is soft, grind down and press on a steel sleeve
	11. Rough surface finish on journal	11. Grind journal to suitable finish
	12. Length to diameter ratio too low	12. Install longer bearing
	13. Excessive pressure	13. Use heavier oil; compounded oil or extreme pressure oil or grease
	14. Improper grooving	14. Use bearing not grooved in pressure area
	15. Abrasive contamination	15. Remove source of contamination
	16. Misalignment of journal and bearing	16. Align journal with bearing
	17. Excessive journal deflection	17. Provide adequate support of journal to eliminate deflection and vibration
	18. Journal eccentricity	18. Replace journal
Overheating	1. Too close clearance restricting oil flow	1. Provide proper clearance
	2. Conducted heat	2. Provide external cooling or use heavier oil or install oil circulating system
	3. Rough surface finish on journal	3. Grind journal to suitable finish
	4. Insufficient radiating surface	4. Install circulating system or cool externally
	5. Insufficient lubricant	5. Supply adequate quantity of lubricant
	6. Improper oil viscosity in relation to speed	6. Provide proper viscosity oil
Corrosion	1. Corrosive contamination	1. Eliminate contaminant source; seal bearing
	2. Corrosive type lubricant	2. Change to non-corrosive type oil
Fatigue Failure	1. Overload	1. Reduce load or use larger bearing; end relieve the bearing inside diameter
	2. Edge loading (a) Improperly machined journal or housing (b) Excessive shaft deflection (c) High operating temperature (contributing cause)	2. (a) Grind journal to suitable finish (b) Correct shaft deflection (c) Reduce operating temperature
	3. Cavitation erosion due to high impact loading	3. Select proper bearing metal; use higher viscosity oil; lower operating temperature; relocate oil holes and/or grooving
	4. Lack of lubrication	4. Provide ample supply of correct lubricant
	5. Insufficient supply of oil	5. Increase oil flow or use eccentric bearing
	6. Cracks and pits resulting from improper grinding, corrosion or high local stressing	6. Change bearing metal or reduce temperature; use smoother bearing or heavier oil
	7. Rough surface finish	7. Use bearing having smooth surface; employ extreme pressure oil
	8. Excessive operating temperature thus reducing fatigue strength of metal	8. Reduce operating temperature; use heavier oil
	9. Cyclic stresses due to improper journal supporting members	9. Strengthen journal supporting members
	10. Incorrect bearing metal	10. Choose proper metal to satisfy conditions.
Scoring, Galling	1. Failure of oil film to carry the load	1. Use heavier oil, compounded oil or grease
	2. Incorrect selection of lubricant	2. Use lubricant suitable to conditions
	3. Abrasive contaminants	3. Use clean or filtered oil; provide adequate seal to keep out grit or use grease
Seizure	1. Too little clearance	1. Provide adequate clearance to accommodate the formation of a suitable oil wedge
	2. Overheating	2. Provide external cooling or ample oil flow
	3. Insufficient supply of lubricant	3. Supply larger amounts of suitable lubricant
	4. Unsuitable bearing metal	4. Use bearing metal having greater anti-seizure characteristics
	5. Incorrect lubricant	5. Use high quality lubricant of proper viscosity. A compounded oil may be required

Men in attendance at session of last year's maintenance conference

PM Conference To Be Held in Cleveland

THE PLANT MAINTENANCE Conference, held in conjunction with the Plant Maintenance Show, will be held at the Public Auditorium, Cleveland, from January 19th to 22nd.

Facilities in panels, conferences and roundtables will make possible the treatment of approximately 5,000 individual problems, in addition to the reading of prepared papers and 4 plant tours.

Eight sectional conferences and 21 roundtables will be held over two-day periods to encourage visitors to consider discussions overnight and submit questions based on their own experiences.

Many of the conferences will be divided into separate groups according to the size of the plant. Top management maintenance problems, common to all industry, will be treated in panels which all will attend.

A resume of the subjects to be covered at the Conference is presented here to give the plant engineer some idea of the maintenance information he can expect to take home from the Conference.

PM—Preventive Maintenance

Monday

The first day's sessions will start with an opening address by L. C. Morrow, general chairman of the conference. This will be followed by a panel discussion from men in prominent fields of industry on "Maintenance Essentials," which will cover planning, scheduling, costs, budgets, training workers and supervisors, work standards and measurement.

The evening session which will consist of sectional conferences, to be held simultaneously, will cover such subjects as Organization; Operating Policies; Preventive Maintenance; Maintenance of buildings, electrical equipment, mechanical equipment, and power plant equipment; and Corrosion Prevention and Control.

PM—Plant Maintenance

Tuesday

The morning session on the second day will also cover sectional conferences, to be held simultaneously. These will cover maintenance in small, medium-size and large plants. Number of maintenance employees will be broken up into the following groups: up to 50 employees; 51-100; 101-300; 301-800 and over 800 maintenance employees.

Another group of conferences will cover "Problems in Plant Engineering." This will also be broken up into 3 groupings. The first group will consider up to 100 maintenance employees, the second group, from 101 to 800 maintenance employees, and the third group will be for those plants having over 800 maintenance employees.

Registration Card

Readers wishing Advance Registration Cards can obtain them by writing "Registration Card" on one of the postage-paid postal cards appearing in this issue, and mailing it.—Editors

In the afternoon session, the various roundtable discussions, to be held simultaneously, will cover the following subjects: Area vs. Centralized Maintenance; Dealing with Union Labor; Incentives and Work Measurement; Lighting; Lubrication; Project Control; Pumps and Piping; Sanitation; and Selling Management on the Maintenance Program.

The roundtable discussions will also cover maintenance problems expressly related to the following types of plants: automotive; chemical; electrical manufacturing; food processing and packaging; foundry; paper mills and paper product; petroleum refining; printing and binding; rubber goods; steel mills and fabricating; and textile.

The evening session will consist of a panel discussion on the subject "Growing Pains of an Engineering-Maintenance Organization."

PM—Round-Up and Banquet

Wednesday

The morning program will cover the second session of Monday's "Maintenance Essentials" panel discussion.

In the afternoon, the second session of Tuesday's 21 roundtables will be held. This will permit visitors to prepare questions on the subjects previously discussed and give them an opportunity to present them at the closing discussion.

The Plant Maintenance Banquet, to be held Wednesday evening, will be the closing session of the Plant Maintenance Conference; however, the Plant Maintenance Show will continue all day Thursday.

Photo: Gulf Oil Co.

It may pay you to investigate savings possibilities of this type of power distribution system in projected plants and systems

The Cost Factor in Common POWER and LIGHT SYSTEMS

By JOHN G. HOWELL, JR., Electrical Engineer

THE 480/277 VOLT, 4-wire, grounded neutral, power distribution system is becoming increasingly popular for industrial plants.[1] Its great appeal is that it can be used to supply electrical energy for both light and power without the need for further voltage transformation. Its particular advantage exists in large buildings and warehouses where the wattage in lighting requirements are considerable. Since with this system the voltage from phase to ground is only 277 volt, the system is acceptable under the National Electric Code for lighting systems where the fixtures are mounted over 8 feet high.

As the power for lighting is distributed at approximately 2.3 times the voltage normally available from the conventional 120 volt systems, a considerable reduction in the size and amount of copper wire for the system can be achieved without exceeding the same equivalent voltage drop.

This reduction in copper will range from 25 to 35 per cent depending upon the peculiarities of the individual installation. As copper wire sizes are reduced reductions can be made in the size of the conduits necessary to carry the wires. However, major reductions in conduit sizes will usually occur only in the conduit trunks which feed the branch lighting conduits. Only a small reduction is generally possible in the size of the conduits connecting the light fixtures since a ½ in. conduit, even at the lower voltage, generally has ample capacity. Thus the reduction in conduit costs may not exceed 10 to 20 per cent.

With over twice as many watts possible of being carried on one circuit, the number of circuit breakers required in the lighting distribution panels is reduced to one half or less. Similarly, where supplementary switches, separate from the panel, are required, half as many switches will often suffice to achieve the same result. While the 480/277 volt 4-wire NH1B-4 lighting distribution panels cost approximately 11 per cent more than the NA1B-4 panels for 208/120 volt 4-wire service, the reduction in the number of circuits actually reduces the distribution panel costs by approximately 25 to 35 per cent depending upon the size of the panel.

Relay operation of the 480/277 volt light circuits on 24 volt control systems is also possible by the use of standard type low voltage relays with suitable barriers between the low and high voltage components of the relays. However, such systems are justified only where selective or remote control of the various circuits is desired.

A major saving with the 480/277 volt lighting distribution systems occurs with the elimination of large banks of 480 to 120 volt transformers and their attendant power loss. However, with almost every installation it will be necessary to install a few, small capacity 480 to 120 volt transformers to care for those miscellaneous lighting installations at less than 8 ft in height or in offices where local switching is desired as well as for convenience outlets and appliances which require 120 volt power.

Such very small requirements may not amount to more than 5 to 15 per cent of the total installed capacity and can be made without seriously affecting the over-all advantages and economics of the higher voltage 480/277 volt system.

[1] For the story on how a newly-developed remote-control system has made possible the use of the 480Y/277 volt system in non-manufacturing buildings see "Choose Your Lighting System by Careful Cost Analysis," by R. H. Lang, General Electric Co., March, 1932, issue, PLANT ENGINEERING.

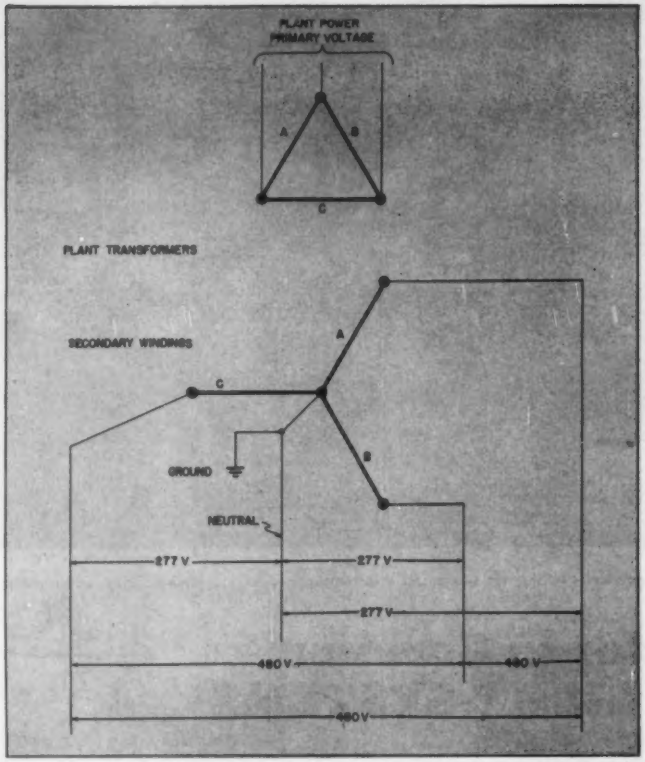


Fig. 1. Wiring diagram of 480/277 volt, 4-wire, 3 phase power and light service

Fluorescent and Mercury Vapor

The major applications to date using 480/277 volt distribution systems have been based on the use of the fluorescent and/or the mercury vapor type of lighting. These installations have been made using ballasts built for operation on 277 volts for fluorescent lighting and 480 volts for mercury vapor lighting. These ballasts are so designed that the fluorescent tubes and mercury vapor lamps are interchangeable with those normally used on 120 volt systems. Thus there is no confusion or complication in the purchasing, storing and installation of replacement tubes and lamps.

Incandescent Lighting

There are many installations, however, where incandescent lighting is more economical or more desirable than fluorescent or mercury vapor lighting. This applies particularly to large warehouses where the lights may have a low use factor and to locations where the cost of power is relatively low. Since the size of warehouses and the amount of lighting demanded in them are both increasing some thought has been given to the adaptation of the 480/277 volt idea to incandescent lighting installations. Such an application does not seem at all impracticable and in certain cases it can have considerable merit in spite of the fact that there are at present no 277 volt incandescent lamps being manufactured and some further modification of the idea is therefore required.

Generally speaking an incandescent lamp of nominal wattage is inherently a low voltage device. For as the voltage is lowered the size and length of the filament can be made heavier and shorter. This simplifies manufacture and extends lamp life.

At present the only high voltage lamps, which are generally available in the range of wattages for normal lighting fixtures, are designed for 230 and 250 volts only. These lamps cannot, of course, be operated on a 277 volt system without a prohibitively high rate of replacement. However, with a little planning it is possible to reduce the system voltage by 10 per cent—from 480/277 to 433/250 volts.

If the taps of the available power distribution transformers do not permit this reduction, small auto-transformers having no more than 10 per cent of the capacity of the lighting load can be installed between the power supply and the distribution panel boards for the incandescent lights. With a new installation the main distribution transformers can be built with appropriate taps generally at only a slight increase in cost, if any. These added costs are small compared to the savings in copper and conduit, in distribution panel costs and in the elimination of lighting transformers.

The principal arguments against a 433/250 volt system for incandescent lighting systems stem from certain characteristics of the 250 volt lamp itself. These are its higher cost and lower lumen output. On the other hand it has a longer rated life than the standard 120 volt lamp which may in some cases compensate for its apparent deficiencies. This is illustrated in Table I, which shows comparison based on a standard 200 watt, pear shaped, clear lamp.

If one is satisfied with a 13.8 per cent lower lumen output, then there is little, if any, difference in operating cost between a 250 volt and a 120 volt lamp. On this basis the major savings that are possible with the higher voltages will amply justify the use of a 433/250 volt system for incandescent lighting.

A minor argument against such a system is the purchasing, storage and replacement complications involved since most plants will find it necessary to carry a stock of the low voltage as well as of the high voltage lamps. With good management this should hardly be a problem.

Power Systems

A 480/277 volt or 433/250 volt system, when used to supply three phase power to motors, requires that three overload relays, one for each of the three motor leads, be provided. Only two overload relays are necessary with the conventional ungrounded delta connected systems. On the other hand, a grounded system with overload relays in each leg is actually an advantage in spite of its slightly higher cost, for with such a system any motor or device that develops a ground fault is automatically and promptly disconnected from the system. This eliminates the need for ground detectors and the painstaking procedures that are often necessary with ungrounded system in the location and correction of grounds.

A further advantage to a grounded system for an industrial plant is that the possibility of over voltages being induced in the system is prevented. It has recently been established that a defective auto-transformer type of motor starter, or an intermittent arcing ground, or even the normal reactance of a potential transformer, inadvertently connected to ground, can set up with the in-

herent capacitance of the system a resonant action to produce severe over voltages.

The over voltages can be sufficient to break down the insulation of motors and other apparatus causing early, if not instant, failure. Over voltages produced by a defective autotransformer starter in one factory are known to have burnt out over 40 motors in a two hour period before corrective action was taken. This could not have happened with a grounded power system.

Advantages Summarized

In summary, a 480/277 volt, as well as a 433/250 volt, distribution system offers the following advantages when applied to an industrial plant:

A. Less copper is required. B. Smaller conduits can be used. C. Twice as many watts can be switched per circuit. D. The distribution panels are smaller and less costly. E. Fewer supplementary switches for local control are required. F. Lighting transformers for major lighting are eliminated. G. Distribution losses are reduced. H. Three phase power loads can be fed from the same source without loss of economy. I. The grounded neutral provides prompt and automatic detection and clearing of ground faults in 3 phase power loads. J. Over voltages that might otherwise damage motor windings are prevented.

Disadvantages Summarized

A 480/277 volt system for fluorescent and mercury vapor lighting as well as for power may have the following arguments presented against its adaption in an industrial plant:

A. The system does not eliminate the need for small banks of 120 volt transformers with panel boards to serve miscellaneous office lighting, convenience outlets and 120 volt appliance loads.

B. The use of two voltage systems for lighting can lead to confusion and perhaps trouble.

A 433/250 volt system as is required for a high voltage incandescent lighting installation may have the following additional arguments presented against its use:

A. The reduced voltage system of 433/250 volts is non-standard and could lead to further confusion.

B. The lower lumen output and the higher lamp cost of the 250 volt incandescent lamp are deterrents to the use of incandescent lamps to high voltage systems.

C. The need to stock incandescent lamps at two voltages can cause confusion in ordering, storing and replacing.

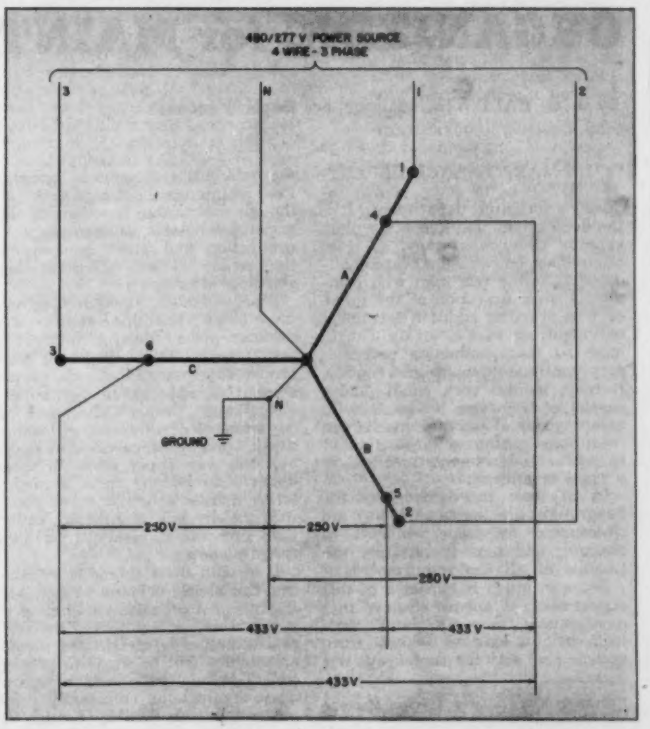
While many of the above arguments against the higher voltages can be readily answered by a broad approach to the over-all problem and a general appreciation of the recognized advantages of a 480/277 volt system the arguments against its adoption must be fully considered in each application. It is no overstatement to say that the 480/277 volt system does have a tremendous appeal and that we may expect to see many more such systems installed in industrial plants in the years to follow due to its inherent advantages.

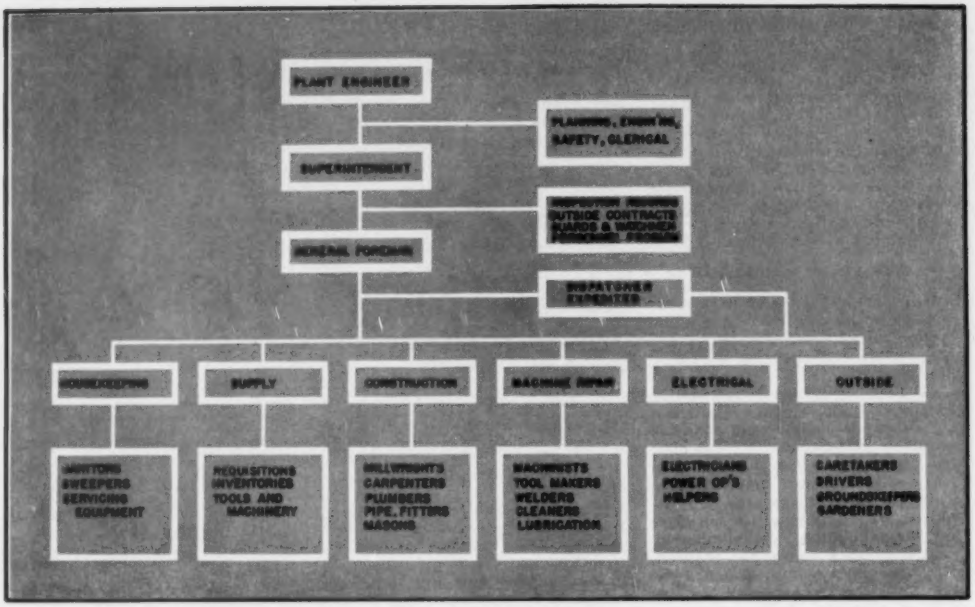
Table I. Life and cost comparison of standard 200-watt, 120 and 250 volt lamps

Nominal Lamp Voltage	A-120 Volts	B-250 Volts	Difference in per cent of B over A
List Price	$ .27 each	$ .50 each	85% more
Rated Life	750 hours	1000 hours	33-1/3% more
Annual Lamp Replacement Cost (30% discount from list)	$1.01	$1.40	38.6% more
Annual Labor Replacement Cost (20¢ per lamp)	$1.07	$ .80	25.2% less
Total Annual L & M Cost	$2.08	$2.20	5.8% more
Power cost/year (4000 hours @ 8 mils	6.40	6.40	——
Total annual cost	$8.48	$8.60	1.4% more
Approximate Mean Lumens	3250	2800*	13.8% less
Annual cost per Lumen	2.60 mils	3.16 mils	21.5% more

* The lower lumen output is due to the greater number of supports required for the finer and longer filament of the higher voltage lamp. At each support the filament is cooler and therefore it emits less light. The cooler filament is largely responsible for its greater life but as the filament is more fragile it is more subject to early breakage should vibration and shock be factors in the installation.

Fig. 2. Typical auto-transformer connections for converting 480/277 volt power to 433/250 volts for serving 250 volt incandescent lighting systems. Kva capacity of auto-transformers is 10 per cent of light and power load at 433/250 volts





One Task for Plant Engineers— ORGANIZING for MAINTENANCE

By J. G. BALDWIN, Maintenance Superintendent*

THE MAINTENANCE DEPARTMENT is, in some plants, industry's forgotten department. It is the department that keeps the plant running come what may, as it so often does on weekends and holidays. It is the few men who completely alter a section of the plant, or who erect an addition seemingly overnight, or who clean up a dirty mess so that production processes may continue without interruption. It may, in the very small plants, consist of a master mechanic with a few good, all-around mechanics, or it may contain a large number of related departments headed by a plant engineer.

In any case the demands of the department are the same. They are widespread in scope, difficult to execute; and time is certainly the essence of all the requirements.

Since so much is expected of this department, it seems strange that management, in some plants, neglects it. As long as wheels turn, sewers run, and the roof keeps out the rain, little thought is given to the maintenance department although the routine functions of this organization are as necessary to production and plant economy as the repair of an important and startling breakdown.

Line and staff function diagrams based on scientific study are common-place among production departments. These diagrams show proper supervisory methods, proper amount of supervision per supervisor, and proper allocation of departments per division; but sometimes a maintenance division operates the way Topsy grew. If there happens to be any form of maintenance organization in these plants it is usually one of urgency rather than one which results from long range planning.

It is with these thoughts in mind that this article is being written, and the included organization chart prepared. First, an analysis of the general situation is given; and second an attempt will be made to present and describe a maintenance department organization sufficiently complete and yet flexible enough to serve any industry. Many records of existing maintenance organizations are available, but each is described as being designed to fit unusual circumstances, and such being the case, it can be of interest only to those who are concerned with a similar product or industry. The writer feels that the approach to this problem should be from the general rather than the specific, and that whatever the unusual conditions may be (and all plants have them), they can well be taken care of within the general maintenance setup for any industry.

In any maintenance setup certain factors have to be considered before formulating a plan. One of the most important is that of new construction. A decision must be made as to whether or not most of the new construction, such as alterations, installation of equipment, etc., will be done by the company maintenance crew or whether it will be done largely by outside suppliers or contractors.

The former method requires a much larger maintenance personnel. However, it has the benefit of put-

* Formerly with Jones & Lamson Machine Company, Springfield, Vt.

ting not only the maintenance department but the company on a more independent basis. In times of increased production demands, and a scarce labor supply, it becomes a means of facilitating work and speeding up service to production departments. It furthermore provides better control of work done, tends to increase the skill of maintenance employees, and provides the maintenance executives with a greater knowledge and understanding of plant equipment and building layout. Since, as stated, this requires a large crew this brings us to another problem which must be decided before setting up an organization plan.

Reserve Manpower

Any company should have a reserve supply of manpower which may be called upon to handle emergency conditions either of a maintenance or a production nature. Serious alterations in production methods or schedules call for an abnormal amount of labor on the part of the maintenance department. A change in production may require additional help at once in some production department such as shipping, for the purpose of boxing or crating an abnormal flow of machines for shipment. Or in the event of an "Act of God" where a wind-storm or flood waters cause unusual damage, there is a demand for an extra number of workers. In order to meet these conditions, additional men must be secured from some source and preferably from an immediate source. Four sources of supply may be considered:

1. Employment of temporary help; 2. use of outside contractors; 3. men drawn from direct or production departments; 4. crews drawn from maintenance department. The first two sources may be criticized on the grounds that there would be a delay and that the help would be unfamiliar with company working routine; the third source is undesirable since it would interrupt production. This leaves us a large maintenance force as the most desirable source of supply help.

Assuming that a full construction crew will be maintained in the maintenance department, it then becomes necessary to plan how they may be profitably employed during the off-peak demands. First, it is necessary to have most of the members of a semi-skilled class so that they may be transferred from time to time to different classes of work. For instance, all carpenters need not be first-class, since much of the work will be rough framing or form building. Such men can easily and effectively be transferred to a production department such as shipping or to a different class of maintenance work.

In any plant there is always room for more and better housekeeping, painting, etc., and this work will take up the slack when construction or production requirements lag. It will, of course, be necessary to have proper job classifications and rates of pay set up to allow for such transfers and to be mutually attractive to management, union, and worker.

In addition to construction and reserve labor problems, there is also the problem of maintenance location. It so often happens that maintenance men spend more time in transit to a job than they do in actually performing the required work. It also follows that dispatchers or expediters spend excessive time in locating workers. Perhaps this is a necessary "evil," but it may be streamlined considerably by properly locating the department or by maintaining men in certain locations or buildings, depending entirely on the size of the industry and the communications and transportation available to the maintenance division. In any case the department should either be centrally located, or certain crews should have fixed stations.

Finally, we come to the condition where over-all production is declining and economies must be instituted such as the curtailment of indirect and maintenance personnel. Here the problem of surplus maintenance help looms to much higher proportions. Fortunately, maintenance men for the most part are apt to be more adaptable than other workers. It is true, that such men usually have some mechanical skills derived from their broad experience or training. Certainly, a woodworking mill man will learn to run a metal cutting machine more quickly than, let us say, a clerk.

Versatility an Asset

It is also true in many cases that the value to the company of a production worker is limited to the particular field of his experience. In other words, where it becomes necessary to cut down shop personnel, it may be possible to retain a maintenance worker by transfer to some other department due to his ability to do more than one job. The retention of maintenance help in this manner is highly desirable where business in the plant lags temporarily while neighboring industries continue with good production thus causing a labor shortage in the locality. Therefore, former maintenance men may continue in the company employ and may, at a later date, return to the maintenance department. Otherwise, such men would have to be terminated and would be lost to the company as they would become employed elsewhere.

Having made the over-all considerations of personnel, work to be done, and location of maintenance organization, we now come to the general plan or organization setup. Such an organization is shown in the accompanying diagram. This diagram is intended as a general basis for any manufacturing enterprise large or small. Certain additions or subtractions or combinations may be made to accommodate extreme situations, but the basic outline is applicable to many industries.

In general the maintenance diagram or chart shown is self-explanatory, but in substantiation of it as such and the function of departments and individuals within it, I should like to give a detailed explanation.

The organization is divided into six divisions, namely: Housekeeping, Supply, Construction, Machine Repair, Electrical and Outside. The reason for this is two-fold. First, there are six divisions because this is about the maximum number of foremen that one supervisor can handle to advantage; second, the six divisions seem to cover or include all the necessary functions of plant maintenance, construction and operation.

Supervision

It also follows that each of these six divisions has about six sections or less, thus keeping supervision in the proper proportion down to the last group and man. For example, we have a general foreman in charge of six main divisions or departments each headed by a foreman, and each foreman has groups or departments headed by an assistant foreman.

In charge of the six divisions mentioned above are three executives, one of which, the general foreman, has just been mentioned. The chart shows certain functions related to each of these officers. Although these jobs should be largely interchangeable in that one

About the Author

In Mr. Baldwin's own words: "Following several years experience as a structural engineer I went with the Maxweld Corp. as production manager. Later for four years, beginning in 1942, I was maintenance superintendent for Jones & Lamson Machine Co., Springfield, Vt. Here we had 3000 employees producing machine tools; I was responsible for 300 maintenance and indirect labor employees. Presently I am manager of the Work Order Department of a large structural steel fabricating company. My present work consists, in large part, of working on equipment for maintenance requirements of various firms in New England."

man should be qualified to substitute for the other, certain definite duties tie in with each. The general foreman's sole function is to supervise and coordinate the six divisions, reporting to the superintendent.

The superintendent in his line of responsibility has charge of assembling work to be done; deciding what jobs have priority over others; deciding within what division questionable work may lie; what and how divisions or departments may be split up or combined to handle unusual jobs; and in addition he has certain staff duties which are not departmentalized, such as supervision of records and inspections, contracts, personnel problems of the entire organization.

The plant engineer is the organization's head and has the entire responsibility for the whole department. Due to his superior experience and ability he will normally assume certain duties other than routine supervision. These will include planning, engineering, safety programs, budgeting, office procedure.

A small concern may well question if it is necessary to have three well trained men to supervise such an organization when one man with an assistant or two could do the job. Such may well be the case and, as was stated previously, such combinations can be made as will fit existing conditions; but there are so many specialized jobs in any industry which require exhaustive study such as lighting, heating, ventilating, new projects, that one of the three top supervisors could well devote his full time to such work for a considerable period of time. When studies are made in this manner by plant men familiar with plant conditions rather than by the engineering department or by outside consultants, results are more likely to be satisfactory.

Let me now briefly mention the main divisions. Obviously a book of some length would be necessary to cover all of the jobs performed, but the important thing to be considered is the allocation of types of work per division. The grouping of different trades under one department and foreman is purposely set up so as to avoid any autonomy of separate groups or too strict an interpretation of work classification.

The divisions are also set up so that many jobs may be done completely within that one group. The divisions thus are more concerned with jobs to be done rather than trade classification. We have no brief against trades; we welcome a skilled tradesman and feel that his rate of pay should be set according to his skill and ability in that trade, but the willingness and ability of a man to turn let us say from rigging to carpentry to blacksmithing, is of great value to the foreman of the construction department and this is especially so in a small plant. The completion of a job in a satisfactory manner with the least amount of supervision and red tape is the criterion of any maintenance organization.

The housekeeping department, as the name implies, is simply one of cleaning building and equipment. It may consist of many subdepartments, with or without a foreman, depending upon the size and location of any group of workers.

The supply department needs special treatment here since it will prove to be something of an innovation. Most companies have a central supply department which services the maintenance department as well as production and other departments. The writer is of the opinion that the maintenance organization should supervise its own supply items, requisitioning, stocking, and inventories. These items demand constant checking and inventory control so that stock may be on hand to do a job which may come up only once in a great while.

It is also advantageous for the maintenance department to have its own tool crib where tools unusual to other departments may be stocked and where all maintenance machines and equipment may be stored under their own control. Supplies common to other departments of the plant should not be stocked within the maintenance department.

The construction division is so arranged, as suggested previously, that as many jobs or as much of a job as possible may be completed by it. It is over-manned particularly with helpers (common labor) so as to be a source of supply labor for any department in the plant. This will probably be the largest and one of the most important of the departments. Here heavy moving of machinery and equipment will be done which calls for great care and experience. All manner of alterations, additions, and demolitions are accomplished by this group, requiring all the arts and crafts that are available. The foreman should be familiar with the building trades and materials of construction. He should be adept at handling men, and be a champion of safety procedures.

The function of the machine repair division is to repair and maintain all mechanical equipment in the plant. Its department should have the ablest mechanics in the plant without exception. Among its groups will be the important though unskilled oilers and greasers who regularly service all equipment and maintain a record of work done. Other groups may fall within this section such as welders, machine painters, etc.

The electrical division is a partner to the construction division in size and importance. Its men must be experienced, subject to call at any time, perfectly loyal and dependable. They truly run the plant since all lights, heat, and power fall within their dominion. This includes the distribution and operation of power to all equipment, the operation of power and heat generators, ventilation, etc. Here construction and electrical departments work closely together since any piping repair or construction would be done by the plumbing group and the wiring would be done by the electricians.

The last of the divisions, namely, the outside, is one covering far-flung activities and therefore is the hardest to supervise. Some of its work may include: gardening and care of grounds; snow shoveling and plowing; railroad and highway maintenance; coal, lumber, and waste trucking; and car and truck driving on general company business.

This then covers in brief the duties of the various divisions or

(Continued on page 160)

North Chicago Plant Engineers Form Third Club in Chicago Area

New group joins rapidly expanding ranks of Plant Engineers' Clubs . . . North Chicago men meet to form nucleus of organization . . . Invitation extended to area plant engineers to become active members of the new group

ON March 9, 1951, a group of plant engineers met to form the Plant Engineers' Society of Chicago. The members of this group, realizing the limitations of a single club to meet the needs of a large industrial center surrounding Greater Chicago, as well as the importance of travel time in a crowded day, outlined plans for the formation of several local clubs.

The second local club to get started was that for the Calumet Region, comprising East Chicago, Hammond, Indiana Harbor and Gary. This group was organized on January 8, 1952, when 22 plant engineers met in Hammond, Indiana, to form the Plant Engineers of the Calumet Region.

On November 10th the third local club was started. A group of plant engineers from industrial plants in and around North Chicago, Illinois, held an informal meeting at the offices of the Chicago Hardware Foundry Co., at the invitation of S. A. Simonson, one of the charter members of the Plant Engineers' Society of Chicago, to discuss the formation of a Plant Engineers' Club for that area.

Two members of the Plant Engineers' Society of Chicago were also invited to attend. Don Brown, President of the Chicago Society, gave a short talk on the aims, plans and general functions of the Chicago group. Ted Ramond, secretary-treasurer, explained the history of the Chicago Society and of the work done during the period of organization.

After a general discussion of the benefits the plant engineers and industrial plants can derive from such an organization, S. A. Simonson was named acting president, and J. E. Church, another charter member of the Plant Engineers' Society of Chicago, was named acting secretary-treasurer. These appointments are of a temporary nature until such time as a regular election of officers is held, and the Club's formal organization is completed.

A committee composed of S. A. Simonson, chairman; J. E. Church, Fansteel Metallurgical Corp.; R. J. Gordon, Griess-Pfleger Tanning Co.; William D. Nelms, Sr., Abbott Laboratories; and Sidney Danoff, Midland Industrial Finishes Co., was appointed by the chair to draft tentative constitution and by-laws to be presented at the next meeting for ratification by the group.

Prospective Members—Note!

Plant Engineers and others with similar job responsibilities who are interested in joining the Plant Engineers' Club of North Chicago may get complete details by contacting S. A. Simonson, Plant Engineer, Chicago Hardware Foundry Co., North Chicago, Illinois; or J. E. Church, Superintendent of Maintenance, Fansteel Metallurgical Corporation, North Chicago, Illinois.

Present at the inaugural meeting of the Plant Engineers' Club of North Chicago, standing, left to right: Don Brown, Corn Products Refining Co.; Wm. D. Nelms, Sr., Abbott Laboratories; Herbert Wickson, Cyclone Fence Div., American Steel & Wire Co.; Ted Ramond, Goodman Manufacturing Co.; Sidney Danoff, Midland Industrial Finishes Co.; R. J. Gordon, The Griess-Pfleger Tanning Co.; and Alex Paul, Ammco Tools, Inc. Seated, left to right: Tom Hanson, Plant Engineering magazine; W. V. Rollins, American Steel & Wire Co.; S. A. Simonson, Chicago Hardware Foundry Co.; J. E. Church, Fansteel Metallurgical Corp.; C. E. Fathauer, Fansteel Metallurgical Corp.; Rocky Marinello, Plant Engineering magazine; and E. C. Czajkowski, American Steel & Wire Co. Mr. Simonson, host to the group, was named acting President

Plant Engineering Club Started in Marion, Indiana

One of the sparkplugs in organizing the club in Marion, Indiana, was a power sales engineer for the local utility . . . Possibly similar action by other utility companies may be of value to their best customer — the plant engineer

ON OCTOBER 14th a group of plant engineers from industrial plants in Marion, Indiana, held a luncheon meeting to discuss the formation of a Plant Engineers' Club.

After lunch there was a general discussion on the organization of a club for that area and the manner in which they should go about getting the group together. The men nominated Charles S. Marks, Indiana and Michigan Electric Co., as temporary chairman, as the first step in getting the organization started.

Members of the temporary credentials committee include: Robert M. Dawson, RCA Victor Division, Radio Corp. of America; E. M. Messersmith, Marion Manufacturing Div. of Dana Corp.; and Fred Molland, Paranite Wire and Cable Corp.

The other two men, Ray Garland, Owens-Illinois Glass Co., and Fred Motsch, Foster Forbes Glass Co., in addition to Charles S. Marks, the temporary chairman, will check into the various constitutions and by-laws and present a draft at the next meeting.

Club Offers Consulting Service

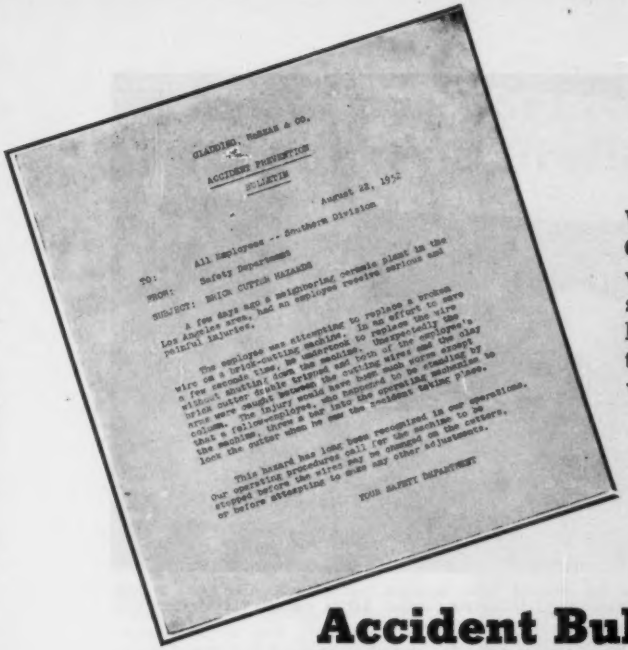
One of the ideas which motivated this group of plant engineers toward the organization of a permanent body was the interest which they have in community improvement. The proposed constitution will include the following statement as one of the purposes of the new organization: "To provide the public and non-profit bodies of the community the engineering experience available from the various members of the group."

In past years many of these men have served on advisory committees appointed by the mayor for the study of professional reports for the improvement of city facilities. The City School Board has also taken advantage of their wide experience in construction during the postwar school building program.

The construction of a new Community Y by the YMCA is occupying the time of many people in the city including a committee of plant engineers. This latter group is serving as a watch-dog committee during the construction, insuring the community that the architects' specifications are being followed by the various contractors.

A second meeting of the Marion plant engineers will be held some time in November. At this meeting they hope to have 100 per cent attendance of plant engineers from the industrial plants in the community.

Present at the inaugural meeting of the Plant Engineers' Club of Marion, Indiana, clockwise around the table: Fred Motsch, Foster Forbes Glass Co.; Rocky Marinello, Plant Engineering magazine; Charles H. Marks, Indiana and Michigan Electric Co.; Fred Molland, Paranite Wire and Cable Corp.; Ray Garland, Owens-Illinois Glass Co.; Robert M. Dawson, RCA Victor Division, Radio Corp. of America; and E. M. Messersmith, Marion Manufacturing Division of Dana Corp.



GLADDING, McBEAN & CO.

ACCIDENT PREVENTION

BULLETIN

August 28, 1952

TO: All Employees -- Southern Division

FROM: Safety Department

SUBJECT: BRICK CUTTING HAZARDS

A few days ago a neighboring ceramic plant in the Los Angeles area, had an employee receive serious and painful injuries.

The employee was attempting to replace a broken wire on a brick-cutting machine. In an effort to save a few seconds time, he neglected to relieve the wire without cutting the stranding, and therefore the wire broke under tension. The broken wire struck the employee's arm with such force that it penetrated both sleeves of his coveralls, and imbedded itself in the flesh of his forearm. Fortunately, the wire missed the vital arteries and the clay in the machine, there was no loss of blood. The employee was taken to the accident saving plant.

This hazard has long been recognized in our operations. Our operating procedure call for the machine to be stopped before the wires are changed or the cutters, or before attempting to make any other adjustments.

YOUR SAFETY DEPARTMENT

Within 6 years Gladding, McBean and Co. rose from the lowest ranks—safety wise—to the highest . . . Thanks to the steps followed in safety program: . . . Initial indoctrination . . . Old timers train new employees . . . Accident prevention bulletins . . . Safer methods

Accident Bulletins Tell All— Result Is Better Safety Record

EVERY TIME a new employee is hired at the Glendale, California, plant of Gladding, McBean and Co., he is handed a manual that tells all about doing his new job safely—and by the rules. Later he is turned over to a foreman for initial supervision and on-the-job training.

Such safety-consciousness is paying off. The company's accident severity rate is only 1/20th the national average for all clay products companies. In 1951, the company's southern division, which comprises 4 plants in southern California, moved to the top of its industry by going 2,800,000 man-hours without a disabling accident. This was the best record ever established in clay products.

Six years ago, the company had one of the most dismal safety records in its industry. Its frequency rate per million man-hours (for disabling injuries) was 95 and the average severe accident put a man out of action for an average of 173 working days.

As an industry usually rated among the first six most hazardous in the country, the company finds itself, today, with a startlingly low severity rate of only 0.06 days per 1,000 man-hours, with but 13 days lost to each disabling accident—among the lowest reported by the National Safety Council.

In 1952, the southern division's whiteware section went 3,200,000 man-hours without a disabling accident, an all-time record for its branch of the industry.

The main object of the safety program is to make all employees safety-conscious. With this aim in mind, the safety program consists of the safety steps listed below, which have helped the company rise within 6 years from among the lowest ranks safety-wise to the highest.

Initial Indoctrination—Each new employee is given an informal 30 minute safety talk. He may be alone or there may be 15 or 20 other new employees with him. With safety graphs, posters, slides and sound film, the safety department tries to impress upon the new worker the importance of safety.

During his 30 minute indoctrination, the employee is given a company manual, "Operating Rules and Safe Practices." This book deals in specifics and was compiled by the plant engineering and safety engineering departments.

Old Timers Preach Safety—Each new employee is assigned work alongside of an old timer in a kind of modified apprenticeship. One of the prime reasons for this system is to hammer safety into the new man. And at the same time, the older employee will watch his safety "P's and Q's" even more.

Accident Prevention Bulletin—Several years ago, an employee was killed while repairing a steam boiler. To eliminate the possible recurrence, the safety department put out a special bulletin. As typical of the things which had made the safety program successful, these accident bulletins drive home safety because they tell about a specific accident in a specific job and every employee realizes that it could have happened to him.

A typical bulletin reads: "While attempting to replace leaky fuse plugs in a crown sheet of a 90 hp steam boiler, a repair mechanic was trapped in a fire box by escaping live steam and received burns resulting in his death.

"The repair mechanic asked a new employee from another department to stand by while he replaced the fuse plug. The boiler had not been fired for 14 hours and the steam gauge showed "zero" pressure. The repairman drained the water to a point below the crown sheet and then closed the drain valve. He then disconnected burners and piping obstructing the fire box door and entered the fire box to remove the leaky fuse plug. When partly removed, a jet of steam blew out from around the plug, trapping the repairman inside the fire box.

"The repairman failed to open the pressure release valve or otherwise vent the boiler before starting repairs. The stand-by man, a new employee, knew nothing about steam boilers, was helpless to act when the emergency arose. He had not been told what emergencies might arise and what to do if anything did go wrong."

The bulletin goes on to show that the method employed in removing and replacing a boiler fuse plug was old fashioned. That the same job could have been done in

5 minutes using a simple socket wrench and with the employee standing outside the boiler. The job of removing and replacing the fuse plug can be done through the fire box door; without disturbing gas lines or burners; without entering the boiler.

Not only was the accident—a fatal one—not necessary, but it actually came about through bad habits. Safer and more efficient methods not only would have saved a life but today saves 29 minutes on every fuse plug replacement job. The moral is that study leading to improved methods can save time, lower cost, prevent accidents, and save lives.

Some plants might have hushed up an accident of this nature but not at Gladding, McBean. Every accident from which employees can learn, becomes subject for a bulletin. A bulletin which goes not only to plant foremen and superintendents, but down the line to employees.

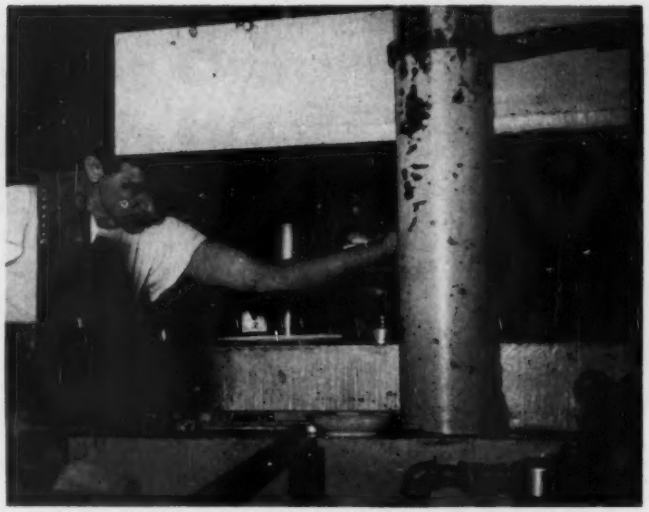
Safer Methods—The company is always looking for safer methods, which not only protect employees' health and welfare but also mean increased production. For example, several years ago, in the production of salt and pepper shakers, holes in the shaker top were bored with a hand-drill, operating about 14,000 rpm and using a regulation steel bit about 3/64th of an inch diameter.

Somehow women working on the shaker-boring line got in the habit of holding the shaker top and actually drilling toward themselves. This is one of those typical examples of habits that should never grow up in a plant but sometimes do.

Actually the women's holding methods, while exceedingly dangerous physically, seemed a fairly efficient production method because drilling holes in ceramic material calls for special positioning and it was difficult to get a jig to do the same job. But when a jig was perfected, production shot up 200 to 300 per cent. Whereas before, 2 or 3 girls worked the entire week at their antiquated anad dangerous methods, now only about 80 hours a week are spent on the same job and 2 girls can handle it nicely.

Suggestion System—This covers ideas submitted for better working conditions, everything from fresher doughnuts in the cafeteria to safety. Cash is paid for first rate safety ideas, the amount varying from $5 to $200.

A sizable award was recently paid for an idea which led to development of an automatic warning system installed at each of 16 blind doorways, which lead onto railroad tracks alongside the plant's spur. The warning system now being installed consists of a flashing red light at each door and also a bell. Only recently, one man ran a fork lift onto the spur just as cars were being spotted and was injured.



Electric eye on this machine forms invisible barrier—holds dies apart as long as operator's hands are in vulnerable position, during periodic check of machine

As an additional incentive to greater safety, every year the company tries something new to spark interest in safety. Last year the biggest event was the Safety Bar-B-Que for the honored guests—members of the Sewer Pipe Department, who had worked more hours than any other department without a disabling accident. The lowest department on the safety totem pole furnished cooks and waiters.

Worker illustrates the dangerous method formerly used to lubricate dies. Split-second timing was required to keep man's hand out of dies. Now, this job is done by safe method of hydraulic lubrication. Note lead-in hydraulic lines

Maintenance Goes Nomadic —and Makes a Profit

WITH INDUSTRY everywhere decentralizing, maintenance has got to go nomadic. Far from being a figment of somebody's imagination, routine maintenance, especially where it concerns materials handling equipment, is a growing problem with plants currently decentralizing operations. Many of these plants have set up (sometimes under government order, sometimes through management decision) branches in the same city, but miles from the parent plant.

Obviously, these newer, and oftentimes smaller units, can't afford a full-time, large-scale maintenance crew to look after vehicles, industrial trucks and mechanized hoists. What's the answer?

E. K. Wood Lumber Co., Los Angeles, which besides large operations in the northwest woods, has some 6 yards and plants in and around Southern California, thinks it has the answer: a mobile garage, which gives its various decentralized installations curb-service maintenance.

Maintenance truck on the job servicing industrial truck at E. K. Wood

The company has invested some $4000 in a maintenance truck which makes scheduled, routine maintenance calls at each branch plant. The truck is equipped to lubricate, repair and make minor overhauls on all materials handling equipment. It carries a complete stock of spares, its own air compressor, mechanic's bench, battery checking equipment—in short, a maintenance shop on wheels.

"Mobile maintenance has been highly successful at our plants," says maintenance superintendent R. J. Smith, who designed the rig.

Let's see how mobile maintenance has paid off. Each of E. K. Wood Lumber Co.'s yards (some have mills associated with them) has from one to a dozen materials handling vehicles. The main plant—a big operation—is in the Los Angeles' industrial district. There, a staff of eight is employed full-time to maintain material handlers. But its branches, in most cases, have no such staff. Instead, in the past, each branch looked after maintenance of its own vehicles. Sometimes a forklift was lubricated at a local filling station. Sometimes a mechanic was hired for the job. But record-keeping was practically nonexistent. The company's main plant had almost no knowledge of what work had been done, what hadn't. Pretty soon persistent breakdowns cropped up.

It was then that Smith devised the mobile maintainer. He designed the vehicles, assigned a mechanic and his helper to the rig. All records were consolidated, kept in the maintenance superintendent's office. The mobile unit, mounted on a 1951 3800 Chevrolet truck chassis, was scheduled to call at each branch at least once a month.

Interestingly, the mobile unit makes its route on Saturdays, calling on from one to three branches. Next week, again on Saturday, it visits other branches.

A regular routine has been worked out. Materials handling maintenance has been standardized. Parts, once purchased by the various branches at list price, now come from the central shop—at volume prices. Saturday is mobile maintenance day because that's the only time that all material handlers are idle.

Once a month, each handling vehicles gets: lubrication, a tune-up, a tire check and change, if necessary, and complete inspection of mechanical and electrical parts.

If a transmission needs replacement or a motor needs changing, the mobile maintainer has room to transport the assembly to the main shops.

Material handling equipment is lined up at each branch plant on the assigned Saturday. The mobile unit goes down the line, running routine maintenance.

The mobile unit carries:

1—Air compressor—(40 cu. ft., operating at 140 psi.) The compressor takes its power off the truck's transmission via 4 V-belt drives. Unit has a 12-in. by 44 in. pressure vessel, which is rigged under chassis.

2—Air take-off for pneumatic tools. This connection is located near the truck's running board, gets its compressed air via a ½-in. hose, and is capable of operating a jack hammer, tire tool, etc.

3—40-gallon engine oil drum, built into unit. This is heavy duty detergent, SAE 30, and drains by gravity into various-sized oil cans, pint to 1½-gal.

4—Three hose reels. One delivers air (for tire inflating); the second works off of rear-end grease drum, and meters grease as it is delivered; third, for chassis lubrication.

5—Battery testing section. Carries three spare batteries, 2, 3 and 2L sizes.

6—Chassis grease drum, with own Lincoln air motor pump. Drum contains 130 lb and is used until empty.

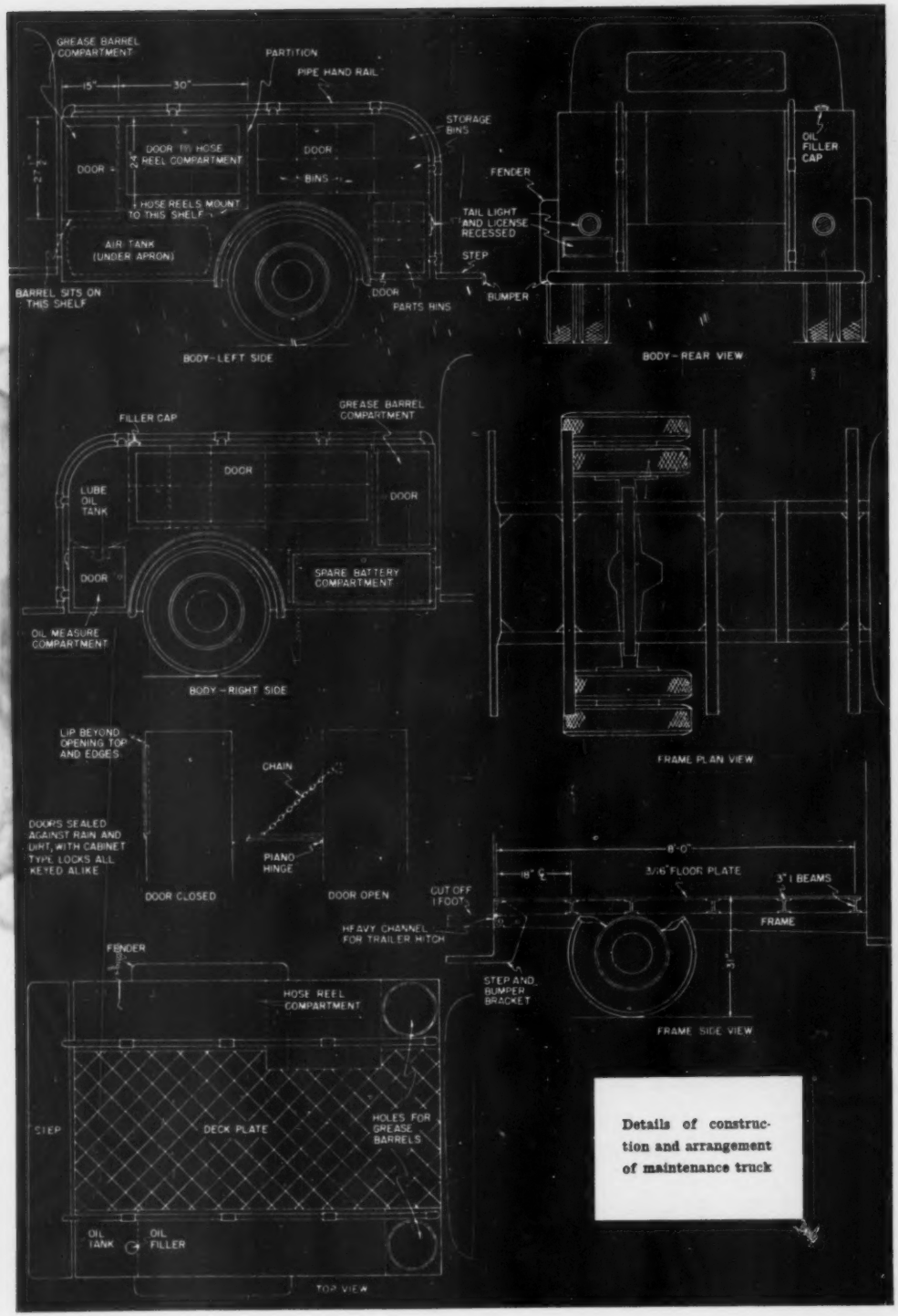
7—All-purpose gear grease drum, with volume pump. Also contains 130 lb of grease.

8—Spare parts. Carries such spares as spark plugs, fan belts; air, fuel and oil lines and fittings; radiator hoses and clamps; fuel pumps; ignition parts (points and condensers); oil filter elements and miscellaneous spares.

9—Spares compartment has cover which can be made up into curb-side workbench — complete with testing gear. A vise clamps on rear of truck.

Maintenance superintendent

(Continued on next page and page 162)



Details of construction and arrangement of maintenance truck

Drum containing lubricating oil is so located that oil flows by gravity into the container directly from the drum

Left: Compressor is rigged near cab. Next to it is compressed air grease gun on top of grease drum, for servicing equipment

Vise fastens to rear of truck and bed of truck becomes a workbench for on-the-spot repairs

Left: Spare parts and small brass fittings are neatly arranged in drawers, within easy reach when needed

Dehumidification for

1. Employee Comfort
2. Cylinder Engraving
3. Testing Laboratory

At Shellmar— Dehumidification Serves 3 Ways

BY F. M. JOHNSON, Air Conditioning Div., Surface Combustion Corporation, Toledo, Ohio

DAMAGING EFFECTS to food products caused by excessive humidity in the air have long been a problem of utmost concern at Shell-Mar Products Corporation, Mount Vernon, Ohio. Since its inception in 1923, Shellmar has been engaged in producing protective bags, envelopes, pouches and wrappers for the highly-diversified food industry.

One of the most difficult problems to overcome in preparation of protective packages for foodstuff enclosure was that of imprinting on the material. A neat, colorful, in-register, printing job is necessary if the packaged product is to make an attractive, eye-catching appearance. Packaging appeal of consumer items is, today, highly recognized as a major sales function of a manufacturing concern. And to imprint multiple colors successfully on temperamental materials was a headache of no little consequence. Now, however, after years of experience, Shellmar is recognized as one of the leading national producers and printers of such packages.

Naturally, precise printing operations are necessary to produce top-quality work. Chemical solutions lose their concentration, and gelatin coatings do not adequately dry under excessive humidity conditions. Hence, long ago it was quite necessary for Shellmar to air condition its cylinder engraving production rooms in order to control properly both temperature and particularly humidity in these operating spaces.

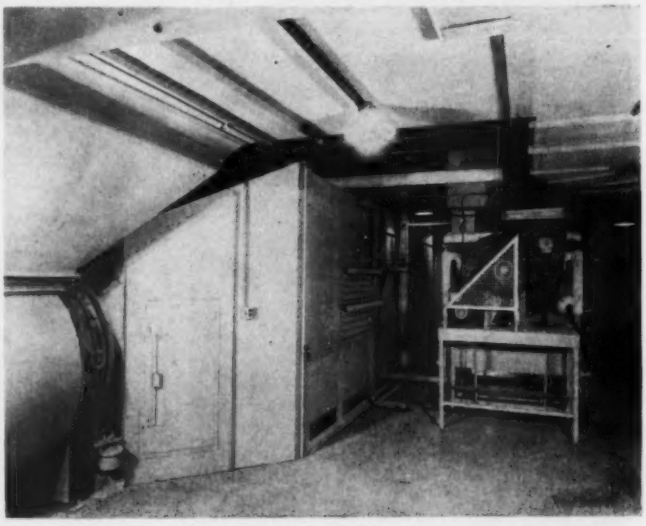
As Shellmar and its customers both became aware of the many and multiple possibilities for protective packaging, it further became evident, as time passed, that facilities for running exhaustive tests humidity-wise on both the wrappers and foodstuffs were imperative. It was necessary to determine how much moisture could be allowed to contact certain powdered foods before they became lumpy and discolored, and what length of time is required to dry out a block of cheese under normal, day-to-day, weather conditions. Then materials of varying quality and thickness should be tested under simulated field weather conditions to determine how well each repels or retains moisture so as to be matched perfectly with the specific hygroscopic foodstuff. In fact, such a program as this is prerequisite to packaging any new line of foodstuff if premium results are desired. Too, research for finer grades of materials finds use for exhaustive tests moisture-wise.

Shellmar now has its research and testing laboratory so equipped as to enable its technicians to duplicate any reasonable combination of air temperature and humidity. In addition, facilities to determine the amount of desiccation, freezer burns and oxidation of frozen foods are incorporated.

Fifteen years ago, Shellmar installed Kathabar humidity conditioning equipment, manufactured by Surface Combustion Corporation of Toledo, Ohio, to attain those desired air-conditioning results in its cylinder engraving production rooms. Today, this chemical liquid, absorbent-type air conditioning system, now modernized, supplies a total of approximately 50,000 cfm of air at normal comfort level conditions to these spaces to prevent loss of chemical solution concentration and delay in drying of gelatin coatings.

A second Kathabar humidity conditioning system was put into operation at Shellmar in 1946 to provide not only for the research and testing laboratory requirements, but also to supply the administrative offices with a summer-time atmosphere of steady, reliable, 78 F and 45 per cent relative humidity air conditions. Hence, a large portion of the Shellmar plant at Mount Vernon is

One of the two 12,500 cfm capacity air washers serving the Shellmar offices and testing lab is centrally located. At right is absorbing solution regenerator



Portion of the Shellmar research and testing laboratory. Weather cabinet in foreground contains a dozen pans of liquid, testing the absorption rate of transparent film

Lobby in the Shellmar office building which, like other office spaces, is maintained at air conditions of 78 F and 45 per cent relative humidity during hot summer weather

air-conditioned: the engraving production rooms for accurate process control, the testing laboratory, and the general office to afford greater comfort for the 200 employees.

Normally, the testing laboratory is maintained at identical air conditions to those in the general office. However, controls are available to the laboratory technicians which allow the air conditions within this space to be altered to fit the need, this without disturbing the 78 F and 45 per cent relative humidity air conditions in the office proper. With such an arrangement as this, it is unnecessary to retain a separate air conditioning system for the laboratory alone.

Shellmar feels that their air conditioning system holds an advantage over those conventional arrangements for providing employee comfort. With properly-balanced temperature and humidity, there is no chill, shock, or clamminess resulting on hot summer days when one passes from or into the office building. Conventional systems many times allow the relative humidity to remain at 50 per cent or above, which accounts for clamminess when one works in the conditioned space, and which provides the chill and shock when entering or leaving the building.

In addition, since the humidity conditioning equipment absorbs moisture from the air prior to its being cooled to the proper delivery temperature, the cooling coils in the system do not condense out any excess water. This results in dry coils over which the air passes just prior to delivery. Many conventional systems allow moisture to condense on these coils. Wet cooling coils provide troublesome maintenance problems, since they are natural dirt collectors, and allow distribution of any bacteria so bred thereon. In a healthful comfort air conditioning system, this should be avoided if at all possible.

In the original system, that for the process engraving rooms, 17,500 cfm of fresh air conditioned by this equipment is mixed with recirculated air from the spaces to provide the 50,000 cfm air total distributed. This fresh air, at maximum design conditions of 95 F and 48 per cent relative humidity, passes over cooling coils in the air washer, contacting a spray of the chemical absorbing solution. The absorbent, consisting principally of a lithium chloride solution base, removes 2460 gal of water per day from the air under maximum operating conditions.

The cooling coils serve a two-fold purpose: to cool the absorbing solution and the air. The colder the absorbent, the more moisture it is capable of retaining. In this installation, 160 gpm of 65 F water recirculated from the aftercooling coils is passed through the Kathabar coils.

After completing the dehumidifying pass, a small amount of the absorbent is reconditioned in a separate regenerator unit. Here the solution is again sprayed, this time over low-pressure tubes. Excess moisture held by the absorbent is driven off and exausted to the atmosphere by a scavenging air stream. Then the solution is returned to the air washer for dehumidification purposes. A total of 2140 lb per hr of 25 psig steam is supplied to the generator under maximum conditions.

For the several process engraving spaces concerned, separate aftercooling and afterheating coils are employed to bring the air to the specific temperature required. Available well water at 55 F is used for the cooling coils. During winter operation, a preheating coil utilizes 1430 lb per hr of 5 psig steam to warm the fresh air from minimum design conditions of —10 F.

One of the process rooms requires a considerably lower humidity than do the others. To acccomplish this, a separate 3500 cfm air capacity package unit, combining the air washer and regenerator chambers on one base, is set in this room's air conditioning line, removing a maximum of 88 gal of water per day.

For the general office and testing laboratory conditioning, 25,000 cfm of fresh air is passed through two 12,500 cfm capacity air washers. An additional 1885 cfm of fresh air is by-passed around the conditioning equipment, joins the conditioned and recirculated air, and is delivered to the 32,500 sq ft of space, including the lobby. From the laboratory, 8565 cfm of air is exhausted.

Operation of the equipment is continuous and entirely automatic. Daily routine maintenance checks are made to determine that the dehumidifier's are kept in top-operating condition. Availability of well water for cooling has kept equipment investment and operating costs at a minimum. There is no "carry-over" of the absorbing solution in the leaving air stream, which could contaminate Shellmar's engraving production materials.

Tapered steel girder (inset) is coming off production line. Right, tapered beams are being erected in a West Coast plant

Tailor-Made Girders for Plant Roofs

Tapered steel roof girders weigh less than average riveted steel girder . . . Have built-in drainage feature . . . And, are specifically designed for a given plant roof . . . It might be well for plant engineers to keep this in mind the next time a roof support problem arises in his plant

IN MOST INDUSTRIAL plants, particularly the small to medium-sized, the plant engineer has a hand in formulating specifications for new expansions, construction projects and the like. In the past, one of the biggest problems has been selection of proper roof-support girders, strong enough to carry overhead monorail systems, yet light enough for building economy. That's one reason plant engineers should know about this newly devised girder.

The object of all this interest is a tapered steel roof girder—made-to-order for your plant—and so designed to weigh 30-200 per cent less than the average riveted steel girder. A typical tapered, fabricated-to-fit girder may be 30-45 per cent lighter than an ordinary standard steel I-beam structure. Also, the new girder's shape is radical. It's wide in the center—where the greatest load is located—and it tapers to a fairly narrow end piece. Equally interesting: each girder has a progressively lower end (or heel) which gives built-in drainage, eliminating costly crickets, saddles and cant strippings.

Because of its tapered construction, the girder allows much less center rise to a plant roof than with either riveted or wood truss construction. Where the ordinary 100-ft-long wood truss has a center rise up to 14-ft, a welded plate girder of the same length has a rise of only 56-in.

Tapered steel girders are all-welded, and come to the plant in a "package deal"—that is, they are designed, fabricated and erected by their manufacturers, the Ross-Carter Corp., North Hollywood, Calif. Interestingly enough, the manufacturer has delivered the girders as far as Ohio, 2000-miles from its plant.

Weight reduction of the girder also means substantial cost economies. A standard steel girder 60-ft span, 24-in., weighs 87 lb per lineal foot, and costs something like 15 cents a pound. The tapered girder, the same length, weighs only 52-lb per lineal foot. Thus a savings of 35 lb per lineal foot.

But from a plant engineering viewpoint the most interesting features are: (1) built-in drainage; (2) made-to-order girders; (3) specifically designed for a given plant roof. Like any girder, the tapered steel roof support is dependent upon these factors: span, spacing, live load, dead load and, if required, concentrated load.

Each girder is individually designed and engineered to the specific job requirements. Whereas before, engineers merely figured the loads required and ordered standard, all-purpose girders, the new aspect of the whole picture is a custom-made girder. This should mean that plants hesitant about some monorail structures because of subsequent high support costs, may be able to have that heavier crane or monorail—and for no additional cost. Big secret is distribution of strength and weight where it's needed—in the center.

Incidentally, the erection job with these balanced girders is unusually fast, averaging about 11 minutes per girder. A 7 man erection crew can put up 30 girders a day.

Holes for access, duct work and utility piping are cut during fabrication, with sizes of these openings determined by engineering design.

Tapered girder members can be installed upside down, right side up, separate, joined or stood on their ends—it all depends on the roof shape desired. In normal position, the girder looks like a low-pitched triangle—the sides forming the roof slope. However, each girder slopes at a different angle—giving the built-in drainage feature.

Steel Bridging Prevents Collapse of Warehouse Floor

By ROBERT WHYTE, Manager, National Department, Machinery Division, Dravo Corporation

JOHN TACK & SONS, truck hauling and excavating contractors of Butler, Pa., have sound economic reasons for appreciating the foresight which led to the selection of steel bridging to brace the floor of the company's warehouse.

Citing convictions based on user-experience, the Butler concern credits steel bridging for preventing a recent incident from developing into a full-scale business disaster. When a portion of the warehouse floor sagged and some joists cracked due to an overload of heavy construction materials, the "stirrup-action" provided by the steel bridging kept the floor from giving way.

The warehouse is used by John Tack & Sons to store plaster and cement. Two inch by 10 in. joists on 16 in. centers which support the warehouse floor began to fail under a load-pressure estimated at 15 tons. The steel bridging, tightly laced over and under the supporting joists in an alternating pattern, kept the joints locked in a vertical position to transmit the weight evenly from joist to joist, thus averting the drastic consequences of a completely collapsed floor.

Had there been no support, or if conventional wood bridging had been employed, it is predicted that the floor would have plunged to the basement with resultant damage to its valuable load and the warehouse structure and, of course, injury to anyone within the building.

The cushioning effect of the Tru-Tye bridging allowed time for workers to lighten the load and repair the floor with a minimum of inconvenience and expense to John Tack & Sons.

Because of its method of installation, this type of steel bridging is particularly designed for solving problems which arise when wood joists with a high moisture content have been employed in construction. Nails used in the installation of conventional bridging, under the above circumstances, have been found to be loosened due to the drying of the joists and virtually no extra support is left for the floor or its load.

When bridging is installed as in the John Tack warehouse no nails are used immediately under the floor. The steel bridging is laced between alternating joists to provide the added reinforcement shown in Fig. 2. With the nailing done on the face of the joist added support of the "stirrup action" is achieved.

Fig. 1. This overload of 15 tons of plaster and cement was saved from damage, as was the floor, by steel bridging which was used to brace the floor of the structure. Workmen were able to remove the load and repair the floor before the partial damage to the floor joists became a business-disrupting matter

Fig. 2. When the floor cracked and the 2 in. by 10 in. joists failed, the steel bridging shown here prevented complete collapse of the installation with resultant savings of reconstruction costs. The "stirrup action" provided by the steel bridging locked the joints in the joists in a vertical position and spread the load

The Workings of Weyerhaeuser's PLANT ENGINEERS' COMMITTEE

SEVERAL multi-plant companies have found increased efficiency of operation to be one direct product of close cooperation between the central engineering department and the plant engineering departments of the various plants. Meetings, agendas, membership, reports and procedure vary between the different firms but the objectives reached are the same.

The Weyerhaeuser Timber Co., probably one of the most progressive firms of its type in the country, has found, through the functioning of its Plant Engineers' Committee, a tool that bites deeply into unnecessary waste of time and product, and needless duplication of effort. Furthermore, knowledge gained at one plant is not restricted to that plant but is circulated freely for common benefit.

This Plant Engineers' Committee consists of plant engineers from the eight branches of the Weyerhaeuser Timber Company and four members from the Engineering Department at Tacoma. All eight of the branches have at least one sawmill, dry kiln facilities and a planing mill; the largest has three sawmills. There are facilities, at several of the plants, for complete utilization of waste materials.

Due to the wide field of interests

Weyerhaeuser's 8th Plant Engineers' Committee meeting held at the Company's Snoqualmie Falls branch plant. Clockwise, beginning with the man in the middle foreground, they are: A. L. DeSpain, Master Mechanic, White River Branch; Dale Alter, Mechanical Superintendent, Klamath Falls Branch; H. E. Hunt, Maintenance Superintendent, Everett Lumber Division; M. H. Munro, Master Mechanic, Willapa Branch; P. A. Rennord, Plant Engineer (standing), Snoqualmie Falls Branch; Arthur Bratlie (guest), Master Mechanic, Snoqualmie Falls Branch; W. A. Hyman, Mill Consultant, Tacoma Office; Lyle Warren, Maintenance Superintendent, Coos Bay Branch; J. S. Abel, Chief Engineer (standing), Tacoma Office; J. W. Gischel, Maintenance Superintendent, Springfield Lumber Division; Conant Dodge, Chief Design Engineer, Tacoma Office; J. A. Dixon, Adminis. Asst. to Chief Engr., Tacoma Office; H. M. Hanson, Mechanical Supt., Longview Lumber Div.

and plants covered the meetings are held, not at one central location, but at each of the branches in rotation. Each of the inspection tours through the host plant points up some feature not common to all the plants.

For the meetings themselves, the Engineering Department from Tacoma acts as coordinator inasmuch as direct contact with each branch is everyday business to the Engineering Department. The plant engineer of the host plant presides as chairman of the meeting—which is usually of two-day duration—and also conducts an inspection trip of the plant's facilities.

The agenda for the next meeting (see illustration) is generally the result of discussions which arise during the meeting through the "one-thing-leads-to-another" method. Often outside specialists are asked to sit in at meetings or present papers on some subject which had aroused interest at a prior meeting.

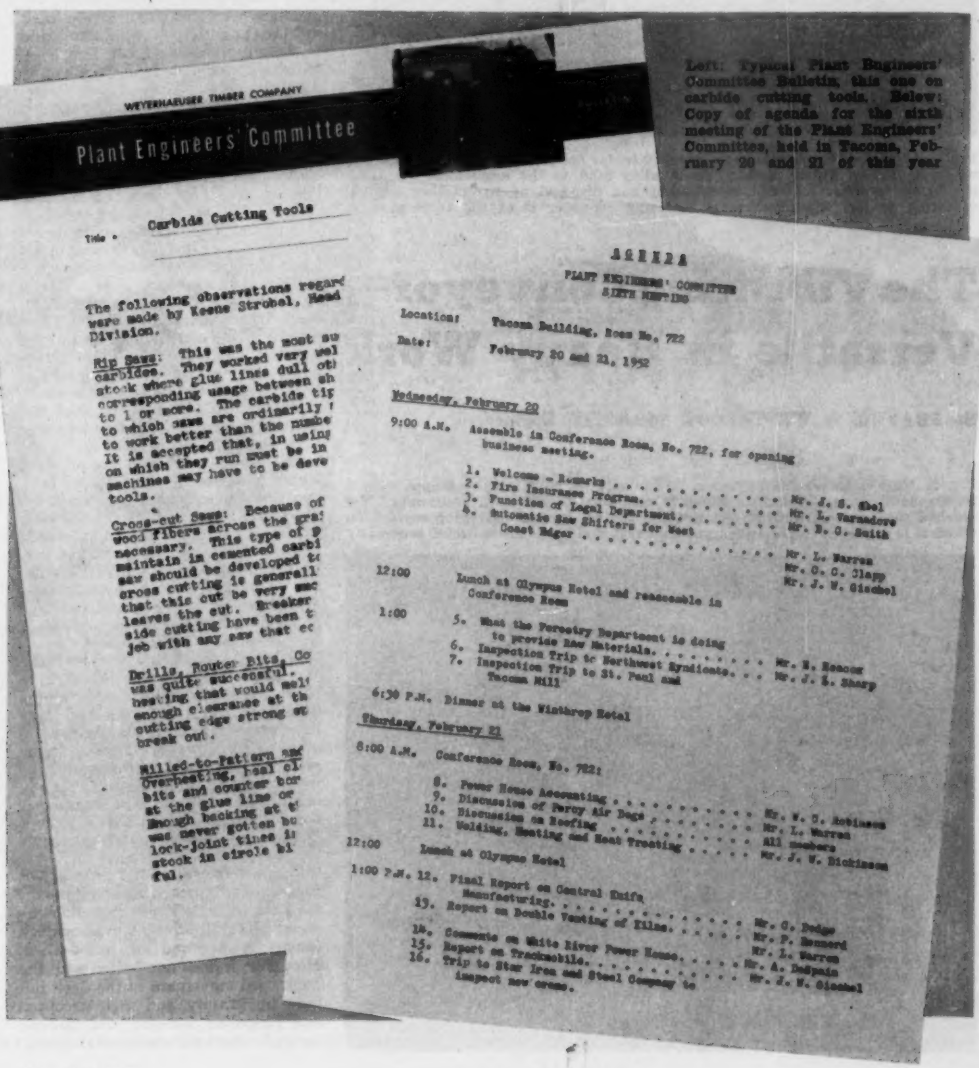
Equipment Reports

Quite often one of the plants will have purchased a piece of equipment "on trial" and, if the equipment is something which can be utilized by all the plants—due to similarity of operation—a report of the desirable and undesirable features of the unit is presented.

At each meeting the host branch for the next is selected. Prior to the next meeting a proposed agenda is drawn up for the host plant engineer's approval. Then the members are notified confirming the tentatively assigned subjects; they, in turn, prepare the assigned reports for distribution prior to the next meeting.

The branch manager, and occasionally the company's general manager, sit in at the meetings along with invited guests.

In addition to these meetings, which are adequately covered by minutes (distributed to plant manager when approved by committee members), information is exchanged by means of Plant Engineers' Committee Bulletins (see illustration). These bulletins may originate from any of the members and are distributed from the Tacoma office.



WEYERHAEUSER TIMBER COMPANY

Plant Engineers' Committee

Title: Carbide Cutting Tools

The following observations regard
were made by Keene Strobel, Head
Division.

Rip Saws: This was the most su
carbides. They worked very wel
stock where glue lines dull ot
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Cross-cut Saws: Because of
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necessary. This type of p
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cross cutting is generall
that this cut be very sm
leaves the cut. Breaker
side cutting have been t
job with any saw that co

Drills, Router Bits, Co
was quite successful.
backing that would mai
enough clearance at th
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Milled-to-Pattern saw
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AGENDA

PLANT ENGINEERS' COMMITTEE
SIXTH MEETING

Location: Tacoma Building, Room No. 722

Date: February 20 and 21, 1952

Wednesday, February 20

9:00 A.M. Assemble in Conference Room, No. 722, for opening business meeting.

1. Welcome - Remarks . . . . . Mr. J. S. Abel
2. Fire Insurance Program. . . . . Mr. L. Varnadore
3. Function of Legal Department. . . . . Mr. R. G. Smith
4. Automatic Saw Shifters for West Coast Edger . . . . . Mr. L. Warren
Mr. C. C. Clapp
Mr. J. W. Gischel

12:00 Lunch at Olympus Hotel and reassemble in Conference Room

1:00
5. What the Forestry Department is doing to provide Raw Materials. . . . . Mr. H. Roscoe
6. Inspection Trip to Northwest Syndicate. . . Mr. J. S. Sharp
7. Inspection Trip to St. Paul and Tacoma Mill

6:30 P.M. Dinner at the Winthrop Hotel

Thursday, February 21

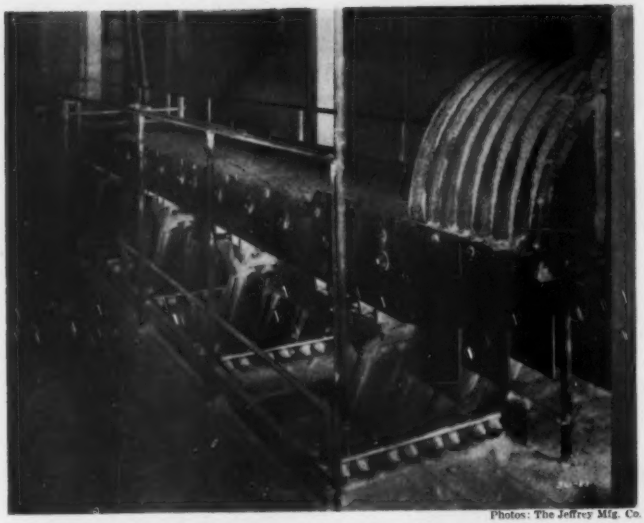
8:00 A.M. Conference Room, No. 722:

8. Power House Accounting . . . . . Mr. W. T. Robinson
9. Discussion of Percy Air Dogs . . . . . Mr. L. Warren
10. Discussion on Roofing . . . . . All members
11. Welding, Heating and Heat Treating . . . . . Mr. J. W. Dickinson

12:00 Lunch at Olympus Hotel

1:00 P.M. 12. Final Report on Central Knife Manufacturing. . . . . Mr. G. Dodge
13. Report on Double Tenting of Kilns. . . . . Mr. P. Bernard
14. Comments on White River Power House. . . . . Mr. L. Warren
15. Report on Trackmobile. . . . . Mr. A. Dedpain
16. Trip to Star Iron and Steel Company to inspect new crane. . . . . Mr. J. W. Gischel

Left: Typical Plant Engineers' Committee Bulletin, this one on carbide cutting tools. Below: Copy of agenda for the sixth meeting of the Plant Engineers' Committee, held in Tacoma, February 20 and 21 of this year



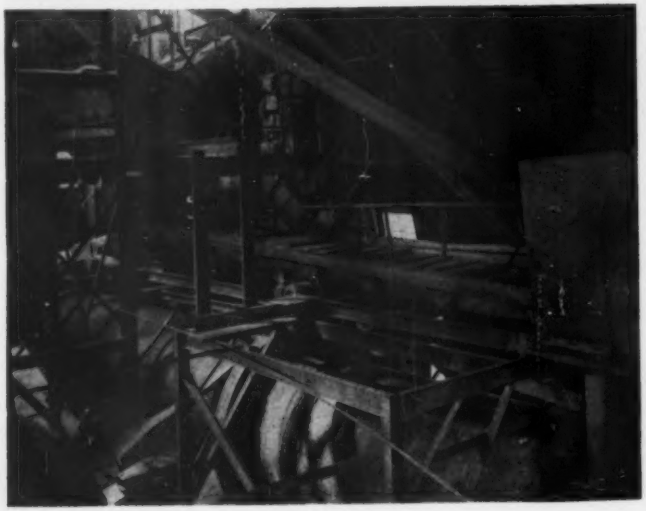
Photos: The Jeffrey Mfg. Co.

Fig. 1. Here an electric vibrating spreader-feeder delivers material to an electric vibrating screen which, in turn, feeds silica sand to the mechanical vibrating conveyor. Oversize material is collected and disposed of by another electric vibrating feeder. The mechanical vibrating conveyor is of the enclosed type

The Vibrating Conveyor—Versatile in Heavy Work

By FRANCIS A. WESTBROOK, Mechanical Engineer

Fig. 2. This single-section conveyor, 36 in. wide by 20 ft long, equipped with a screen cloth conveying surface which is used to scalp off trash and lumps. The finished sugar passes through the cloth to the solid plate conveying surface on which it is conveyed to the discharge end. Trash and lumps are collected separately



THE MECHANICAL vibrating type conveyor has been developed for applications where types such as belt, screw and roller conveyors and others are not adaptable, or only partially suitable.

Due to its design, this type of conveyor may handle lumpy or abrasive, hot or cold, soft and fine materials without undue wear, and with maximum safety, as well as minimum consumption of power. It operates successfully on inclines, up or down, of 10 deg from the horizontal. It may also be enclosed for the handling of gaseous, dusty or toxic materials or for conveying the material in an inert atmosphere.

It is obvious from the foregoing that these conveyors have a wide field of application. In foundries, for instance, they are extensively used for the handling of shakeout sand from continuous mold conveyor systems or roller conveyor systems and for the handling of hot castings. Their versatility is further suggested by an installation in a sugar refinery and another in a silica sand plant.

The vibrating conveyor is of rugged construction with handling capacities up to many tons per hour at speeds approaching those of belt conveyors. The design is simple. It consists of a pan or tube conveying surface mounted on cantilever spring bars, a counterweight also mounted on cantilever spring bars, structural steel base and drive motor. The weight of the conveyor deck and the counterweight balance each other, while the number and thickness of the steel cantilever spring bars are so related to these weights that the natural frequency of the machine is very close to the speed of the drive.

The steel cantilever spring bars which support the conveyor deck and the counterweight are uniformly spaced and mounted on the base frame. The counterweight is located below the conveyor deck and vibrates in the opposite direction from the deck. Thus the opposing forces at the mounting point are equal and opposite and there is no vertical or horizontal reactionary force.

Since the restoring force of the cantilever bars is the basic drive force, the drive motor simply maintains the balanced forces and very little additional power is required to operate the conveyor. The base frame requires no special vibration absorbing mounting and may be lightly lagged in position. The cantilever bars are attached to the conveyor deck at the most advantageous angle for the service required.

When in operation the deck moves forward and upward, and as it moves backward the deck also moves downward. Material on the vibrating deck moves upward and forward with it. However, it does not return with the backward movement of the deck but falls by gravity and is intercepted and propelled forward and upward again by the next stroke of the deck.

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"EXPRESS" HANDLING IN YOUR PLANT
for loads up to 15 tons

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The P&H Trav-Lift crane gives you precision handling at *lasting* low cost. It's custom built to your needs from money-saving standard designs . . . with various spans and lifting speeds and a choice of cage or floor push-button control. If your requirements demand intermittent crane service, then you need the Trav-Lift . . . built only by P&H, consistent leader in the field of overhead handling equipment. Call a P&H materials handling engineer. You'll be helped *more* by his specialized experience.

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HARNISCHFEGER CORPORATION

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For more facts circle 558 on Reply Card

Can Ductile Iron Be of Use to You?

Do you have use for a material with the following properties? . . . High wear resistance . . . Oxidation resistance at elevated temperatures . . . Fatigue resistance . . . Resistance to shock loads . . . Weldability . . . Machinability

BRIDGING THE GAP between ordinary gray iron and cast steel, ductile iron is being found the end goal of a search foundrymen have been making for generations. Its outstanding strength as well as ductility, in addition to its resistance to shock, is especially useful throughout the industrial world. Automotive, agricultural implement, machinery, petroleum, railroad, and scores of other industries are applying it to hundreds of uses.

Ductile iron, a development of International Nickel Co., is a high carbon ferrous product containing graphite in the form of spheroids. With gray cast iron, the graphite is in the form of flakes which form a multitude of notches and discontinuities in the metallic matrix, and because of this is a relatively weak and brittle material. Compacting the graphite in the form of spheroids reduces internal notching to a minimum and greatly increases the proportion of effective matrix structure.

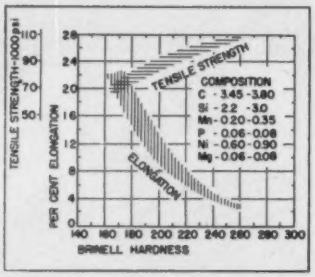
Where It Is Used

A new product made possible by utilizing the fluidity and the high mechanical properties of ductile iron is pipe for city water and other lines. Pipe, 8 in. in diameter, 18 ft long, with a wall section of 0.42 of an inch, was cast as readily in ductile iron as in gray iron.

Gray iron pipe failed hydrostatically at a pressure of 2,400 psi and shattered into a large number of pieces when it burst. Ductile iron pipe expanded under pressure and developed a pronounced bulge in one zone. Failure finally occurred at a pressure of 5,300 psi in the form of a longitudinal crack along the bulge and with no shattering. It is probable that the use of this pipe now will be permitted for the transmission of fluids and gases now barred to gray iron because of lack of ductility.

Another outstanding property of this material is its excellent resistance to mechanical wear in both the lubricated and unlubricated conditions. A typical example is one involving the bevel gears in a pump handling crude petroleum products. Gray iron gears had a service life of 300 hours and at that time showed excessive pitting and wear at the pitch line. Ductile iron gears in the same application were run over 1000 hours with no deterioration or pitting.

Foundrymen working with this material immediately recognize its unusual fluidity and its ability to fill intricate molds. An example of its use in this connection is in casting the head of a reciprocating compressor which could not be readily cast in steel and which had inadequate properties when cast in gray iron. Complex valves formerly made in bronze are now being made of this material. It is also used for making high-pressure intricate parts on hydraulic machinery.

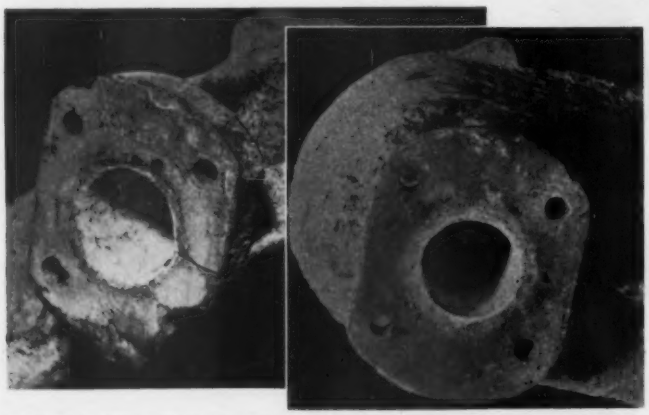


Graph shows properties of ductile iron

To show the range to which ductile iron may be used, commercial castings can be made from those weighing an ounce or two with a section of 1/10 in. thickness up to anvil blocks weighing 50 tons and having a section 48 in. thick. While a great variety of castings is used in the quenched and drawn condition, most of them are either in the as-cast or annealed condition.

As to its weldability, ductile iron can be readily arc welded following the techniques established for gray iron. A number of ductile iron parts are now welded in a routine fashion to steel, to highly alloyed materials and to ductile iron itself. The tensile strength of the weld metal is about 60,000 psi and the amount of ductility will range up to 10 per cent or even higher depending on the welding and thermal conditions.

Annealed ductile iron can be machined at cutting speeds of 700-900 fpm. As a result, annealed ductile iron can be machined at a rate 2 to 3 times that of good quality gray iron in the as-cast condition. Consequently, in producing items such as automotive gear cases, this means that the daily output for each machine tool can be doubled or tripled by substituting this material for gray iron.



Left: Gray iron spout of pouring trough carrying molten aluminum cracked and required replacement in about 3 months. Right: Ductile iron spout carried 27 million pounds of molten aluminum at temperatures up to 1440 F in 18 months and, as can be seen in the illustration above, shows no sign of deterioration

Want More Information?

If you do, simply write "Ductile Iron" on one of the postage-paid postal cards appearing elsewhere in this issue, and mail it.

HOW TO SQUEEZE MORE DOLLARS OUT OF YOUR PRODUCTION BUDGET

THE GOULD PLUS-PERFORMANCE PLAN—A library of technical information that tells you how to select, charge, maintain and determine the condition of lead-acid batteries. It's free. Write Gould Battery Information Headquarters.

There are two sure ways to make your production dollars go farther:
1) Power your industrial trucks with Gould "Thirty" Batteries;
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Here is complete assurance of maximum battery performance throughout longest possible service life. For real materials handling economy, take advantage of this cost-cutting combination . . . write for full information on Gould "Thirty" Batteries and the Plus-Performance Plan.

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Who Pays for Spec Errors?

By ALBERT WOODRUFF GRAY

CONSULTING ENGINEERS were employed by the owner of a building in Washington, D.C., to prepare plans for a heating system adequate to maintain the temperature in the building at 70 deg. On these plans and specifications a contract was made for the installation of the system for $4,602. After it was completed the system was found inadequate and an investigation disclosed a mathematical error in the specifications.

The defect was remedied by a relocation of one heater and the installation of 3 additional heaters at a further cost of $1,403. The total cost of the two jobs, the original installation and this second or supplemental one was $6,005, which included an increase in labor and material costs of $183.30.

The owner sued the engineers for the additional expense of $1,403, represented by the second contract. This the court[1] refused to grant, permitting a recovery of merely the $183.30, the increase incurred through the delay arising from a failure to prepare proper plans in the first instance.

The engineers, asserted the court, contracted to furnish plans for a heating system which would heat the building to 70 deg. Through negligence they failed to furnish the proper plans. Had the original plans been free from error the heating system would have cost $183.30 less than it did by the use of the original and the corrected plans. The error of the engineers cost the owner this sum and they are liable for that amount. That sum places the owner in the same position he would have been in if the error had not been committed.

"It is true that this error caused the owner to believe and expect he would get the plant at a less price than it actually cost but without some special circumstances the law does not provide for disappointment over the non-realization of a belief or expectation."

This same rule in the computation of damages was set out by the Supreme Court[2] of the United States almost a hundred years ago.

"The general rule," said the court, "is that when a wrong has been done and the law gives a remedy, the compensation shall be equal to the injury. The latter is the standard by which the former is to be measured. The injured party is to be placed, as near as possible, in the situation he would have occupied if the wrong had not been committed."

An amusing incident in the application of this rule occurred recently in a District of Columbia court[3] where damages were claimed for the failure of a seller of a house to replace a wooden toilet seat according to an agreement with the purchaser. The suit was brought not only for the cost of a new seat but for a new stool and tank together with the installation expenses, on the ground that a new seat could not be found to fit the old stool.

"Compensation is a fundamental principle of damages," said that court. "The purchaser was entitled to be put in as good a condition pecuniarily as he would have been by performance but he was not entitled to be placed in a better position. We fail to see how under any circumstances the agreement to replace the seat can be stretched to include the seat, stool and tank."

Profits lost through a failure of engineers to properly prepare plans and specifications may under some circumstances be recovered but there are limitations on such a recovery that were summarized by the Supreme Court of New Jersey.[4]

"Loss of profits are only recoverable as damages where they might have been realized and are capable of being estimated with a reasonable degree of accuracy, but profits which are remote, uncertain or speculative are neither an element of damages nor evidence thereof."

In an action some years ago involving the preparation of plans for the construction of a building at Tampa, Florida, the owner claimed the architects were responsible for the loss of rentals from the property due to mistakes made in the plans.

The comment of the Florida Supreme Court[5] in this action gives a safe and sane rule for the computation of damages of this sort.

"When on account of defects or of some oversight it is necessary that repairs be made, the claimant cannot make them at unnecessary expense or in an unnecessarily extravagant form and recover the amount of his disbursements. He must confine his claim to such sum as will represent the cost of effecting the repairs as economically as it is possible to effect them, consistent with proper workmanship and construction. This rule takes no account of loss of rentals or delays which are too remote and speculative to be considered."

This same rule was applied in the decision of a lawsuit[6] by an engineer for damages. He had submitted plans for the construction of a water system at Haverstraw, New York. The project was subject to approval by the town trustees which was refused. The engineer then sued for the damages he claimed he had incurred from the withholding of this endorsement.

Asserting that the engineer had no claim for damages the federal appellate court said, "He lost nothing and damages ordinarily do no more than put the person to whom the promise has been made, where performance of the contract would have put him."

In Virginia a few months ago the Supreme Court[7] of that state had for review a claim against an engineer for damages claimed to have been incurred as a consequence of defects in plans for the installation of a heating plant. The owner, however, had not corrected the defects in the system and had sold the property without making any expenditure whatever.

"While it is true," said the court, holding no recovery could be had against the engineer for these mistakes, "that upon breach of a valid and binding contract the law infers nominal damages, it does not infer substantial or compensatory damages. The person claiming to have been damaged must not only show that he has sustained damages by reason of his rights being violated, but he must show with reasonable certainty the extent of such damage.

"He is not allowed to recover for a breach of contract more than the actual loss sustained by him nor is he allowed to be put in a better position than he would have been had the wrong not been done and the contract not been broken."

[1] Henry J. Robb, Inc., v. Urdahl, 78 Atl. 2d 387, District of Columbia
[2] Wicker v. Hoppock, 6 Wall. (U.S.) 94
[3] Clark v. Cleckley, 55 Atl. 2d 287, District of Columbia
[4] Van Dusen Aircraft Supplies, Inc., v. Terminal Construction Corp., 70 Atl. 2d 65, New Jersey
[5] Bayshore Development Co. v. Bonfoey, 78 So. 507, Florida
[6] Potts v. Village of Haverstraw, 79 Fed. 2d 102, New York
[7] Orebaugh v. Antonious, 58 S.E. 2d 873, Virginia

NPB Electri-Centers blend into surroundings naturally, don't have that "electrical look." Wireway extensions replace exposed conduit pipes on wall leading from ceiling to panel cabinet. Column may be extended to floor if desired.

Slim dimensions make it easy to install NPB panels where wall space is limited or not available. They slip easily inside a standard 8" H-beam, fit snugly because of rounded corners. Front overlaps back for deep recessing.

LIGHTING PANELS CAN BE ATTRACTIVE

No maze of conduit pipes or cables leads into *these* lighting panels . . . and they cost less to put up!

BullDog NPB Electri-Centers eliminate the high expense of bending pipes to fit panel knockouts, and pulling wires down through conduit pipes. All wires, from ceiling to panels, are contained in wireway extensions. Neutral wires are attached to neutral bar in Pull Box at ceiling (or in false ceiling), eliminating individual neutral wires down to cabinet. Wiring can be inspected any time by simply removing front. Pushmatic ® circuit breakers, interchangeable from 15- to 50-amps., make NPB Electri-Centers® compact, versatile.

Use NPB Electri-Centers for any commercial or industrial surface-mounted lighting-panel installation up to 32 circuits. They get rid of "open-plumbing look" in offices, hallways, factories and shops. They may be mounted against walls, on columns, or in H-beams. Streamlined for appearance and safety; no sharp corners to snag, scrape or bump. Finished in beautiful gray enamel, or you paint to any color scheme.

Investigate NPB Pushmatic Electri-Centers now! See your nearest BullDog supplier, or write for NPB Bulletin. You'll save on installation costs.

BullDog Narrow Column (NPB) Pushmatic Electri-Centers make attractive lighting panels; give easier, lower-cost installation; eliminate unsightly conduit pipes and cables.

NPB FEATURES ARE YOUR ADVANTAGES!

- NPB's are only 6¾" wide, 6⅝" deep. Come in 16-, 24-, and 32-circuit capacities. Listed by Underwriters' for 1 ph., 3 wire, s.n., 120/240V A.C. or 3 ph., 4 wire, s.n., 120/208V A.C.
- Wireway extensions reach to ceiling or false ceiling regardless of height, or to wiring in truss-constructed buildings.
- Lightweight, easy to handle; no loose parts to misplace.
- "Open-plumbing look" eliminated with wireway extensions.
- Numbered wire retainers are attached to back of box for circuit identification. All wiring, including main lugs, can be done before interior is installed.
- Attractive, interchangeable BullDog Pushmatic Circuit Breakers make NPB Electri-Centers compact, versatile.
- All copper current-carrying parts silvered for greater conductivity.
- Sell for price of ordinary panels; much cheaper to install.

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY

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The 27 major buildings which house Wenatchee Works cover about 19 of the 85 acres located inside the plant fence

Giant storage bins hold aluminum oxide for use in plant. Over 32 million lb total alumina capacity is stored in 9 bins

From Apples to Aluminum

Aluminum industry moves into rural Northwest . . . Apple orchards transformed into reduction plant . . . Thirteen months from ground breaking to first pour of aluminum . . . Columbia River power harnessed to provide kilowatts

THE RECENT DEDICATION of Alcoa's new aluminum reduction plant, in Wenatchee, Washington, took one of PLANT ENGINEERING's editors to the Pacific Northwest to inspect the new facility.

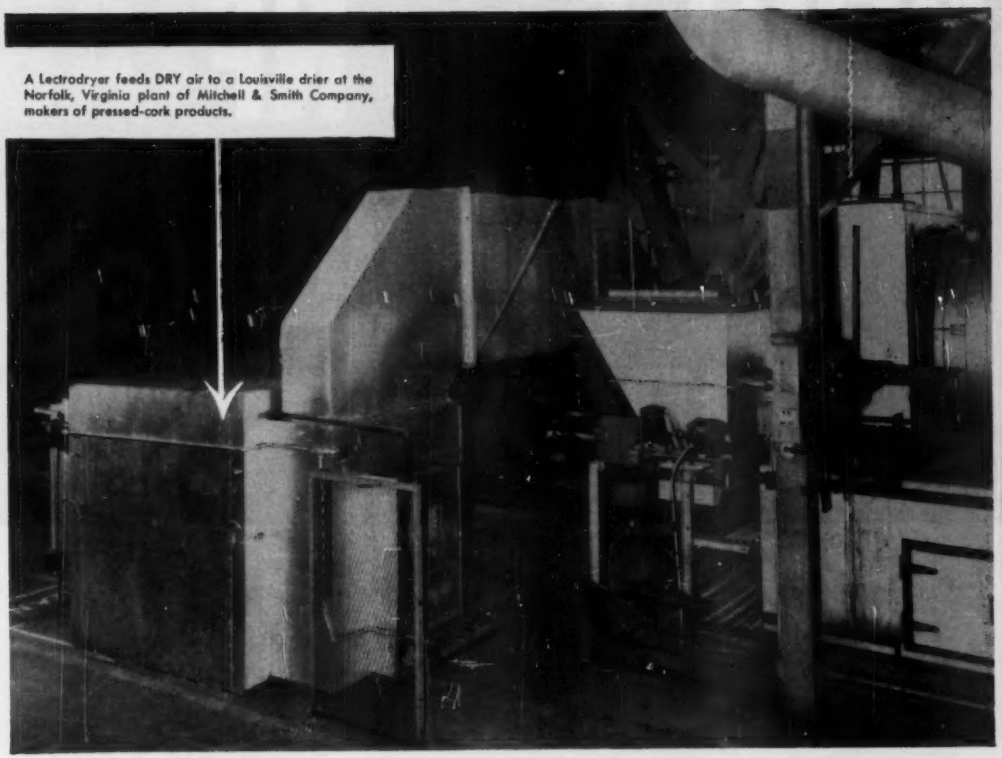
Wenatchee, already famous as the "Apple Capital of the World," is all that the name implies, with apple orchards dominating the surrounding valley. Alcoa used this theme with their dedication memento, an apple-shaped aluminum coin, appropriately labeled, "The New Product of the Wenatchee Valley."

The reduction plant is designed for a production capacity of 170,000,000 lb of aluminum per year. The raw materials, alumina and cryolite, are shipped in by rail. Four pot lines, made up of 142 pots each, comprise the reduction plant proper. Since approximately ¾ lb of carbon is used to make 1 lb of aluminum, the carbon supply was extremely important. Therefore, facilities for carbon production were built on the site.

The necessary power is drawn largely from the Bonneville Power Administration's Valhalla substation, located on the hill overlooking the Alcoa plant. Flowing into the plant through the long, narrow rectifier room, the current is changed from alternating current to the direct current required for reduction of alumina.

Mercury-arc rectifiers housed in 860-ft long building convert the power supply from alternating to direct current

Pot line where alumina is reduced to aluminum. Bus bars carry current through the entire pot line in series



A Lectrodryer feeds DRY air to a Louisville drier at the Norfolk, Virginia plant of Mitchell & Smith Company, makers of pressed-cork products.

DRY AIR is part of their formula in blending powdered cork

Formulation of cork products calls for some water, but not as much as the raw cork usually contains. Some of the moisture must be removed by tumbling the powdered cork in a rotary drier, through which heated DRY air is passed.

Lower air temperatures—desirable to prevent injury to the cork—can be employed when that air is preconditioned by a Lectrodryer,* since DRY air removes moisture faster.

You can make DRYing a part of your formulas by installing Lectrodryers to remove unwanted moisture from air, gases and organic liquids. Delicate chemical reactions can then be held on the straight and narrow path more easily. Low humidity in workrooms and storage areas prevents contamination of materials that pick up water. It keeps them moving freely in machines and conveyors, speeding up production.

For help in adding DRYing to your processes, write Pittsburgh Lectrodryer Corporation, 333 32nd Street, Pittsburgh 30, Penna.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sydney.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
In Belgium: S. A. Belge Stein et Roubaix, 320 Rue du Moulin, Brussels-Liege.

LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

* REGISTERED TRADEMARK U.S. PAT. OFF.

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NEW! Type NPLAB plug-in breaker panelboard...

One basic unit meets majority of lighting and appliance branch circuit application requirements without special adaptation

NOW, WESTINGHOUSE OFFERS YOU...

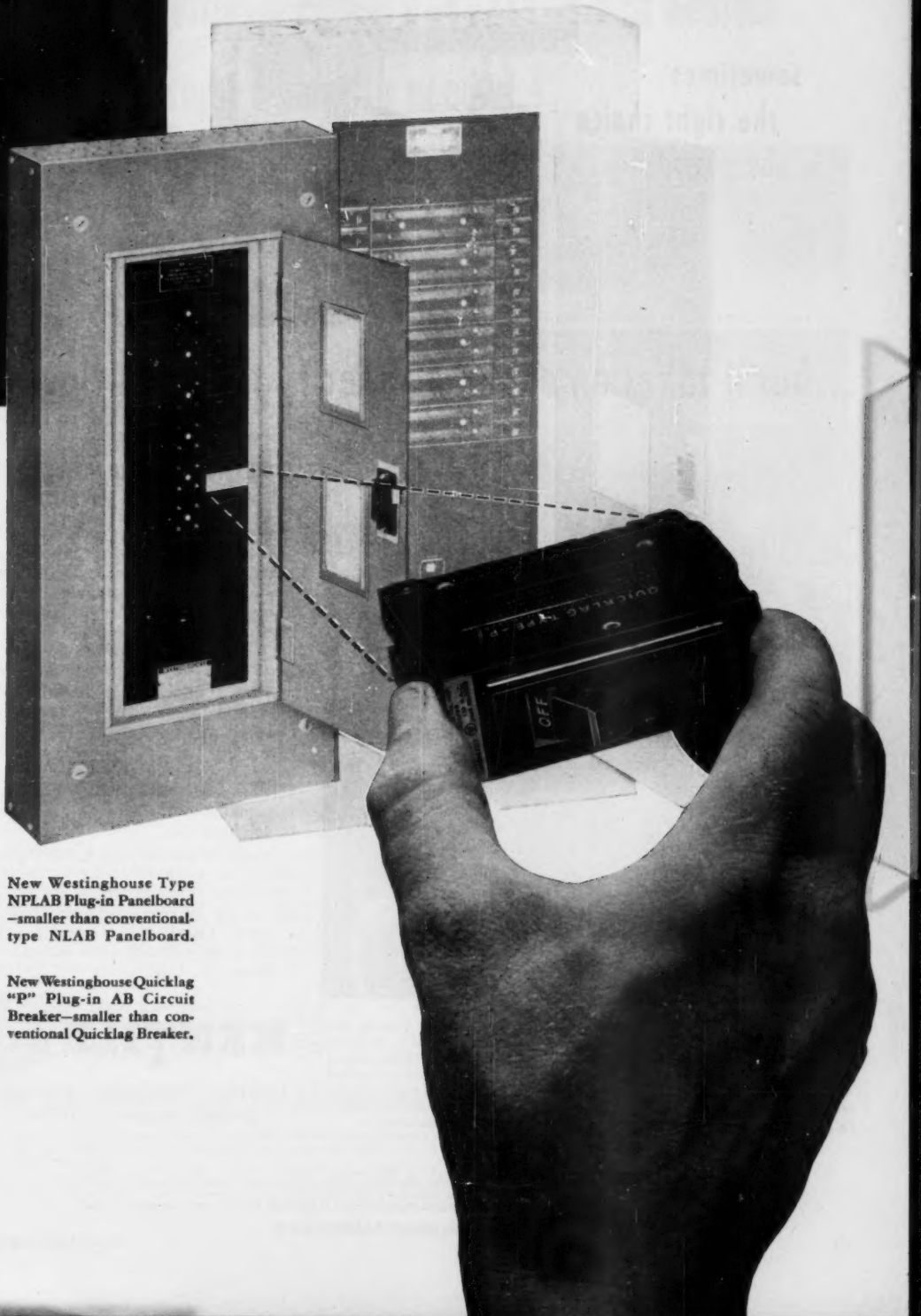
1. Industry's first Thermal Magnetic "De-ion" Plug-in Quicklag® Circuit Breaker—superior protection, proved efficiency.
2. Available for 1-phase, 3-wire, 115/230-volt SN, 3-phase, 4-wire, 120/208-volt SN services with 15 to 50-ampere, 1 pole branch breakers. (2 pole independent trip branch breakers available by adding handle extensions to two 1 pole breakers.)
3. Quick-make, quick-break action—fast, positive, safe.
4. New circuit breaker smaller than conventional Quicklag types—saves critical panel space.
5. New Type NPLAB Plug-in Panelboard smaller than conventional-type NLAB Panelboards—reduces job costs.
6. Permanent visible-phase identification on 3-phase, 4-wire panelboards, during and after installation; no guessing about load balancing.
7. Snap-on covers for neutral bar and main breaker—real time savers.
8. Rigid mounting of panel chassis assembly—offers a lifetime of protection against misalignment, breakage, accidents.

Westinghouse Type NPLAB Plug-in Panelboards have the flexibility, in one basic unit of standard design, to meet the majority of lighting and appliance branch circuit requirements with minimum engineering or special construction. Where else can you buy economical "De-ion" AB Circuit Breaker protection, fully pre-assembled into Westinghouse quality-built Panelboards?

Get in touch with your Westinghouse Representative, or write for B-5644, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa. J-93486

YOU CAN BE SURE... IF IT'S Westinghouse

"DE-ION" BREAKER PANELBOARDS



New Westinghouse Type NPLAB Plug-in Panelboard —smaller than conventional-type NLAB Panelboard.

New Westinghouse Quicklag "P" Plug-in AB Circuit Breaker—smaller than conventional Quicklag Breaker.

sometimes
the right choice
is obvious

...but it takes an expert to specify the right floors

SPECIAL (greaseproof) KENTILE *is an extra-rugged, greaseproof Flooring that resists industrial oils and greases, alkalis, alcohols and most acid solutions. It is ideal for laboratories like the one shown above, installations where food is prepared or served, garages and light manufacturing areas. Like Kentile,* SPECIAL KENTILE *cleans easily and economically... retains its modern colorful beauty even under the most rigorous conditions. And, it can be installed over any smooth, firm interior surface... even below grade over concrete in direct contact with the earth.*

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His advice and recommendations are directed towards helping you choose the one floor that's right for the area in question... the one floor that will give the longest service for the lowest cost... whether it be for heavily-trafficked hallways and assembly rooms or gaily colorful leisure areas.

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KENTILE INC.

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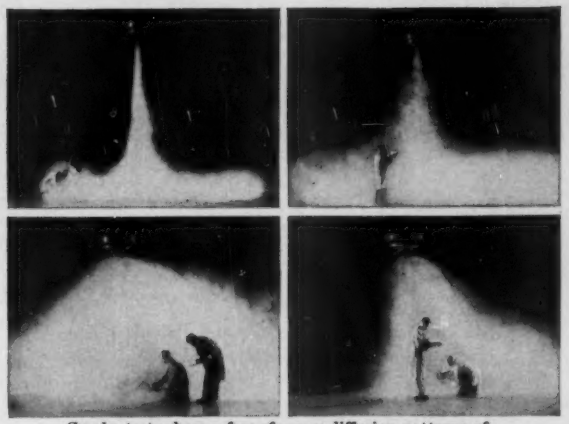
For more facts circle 563 on Reply Card

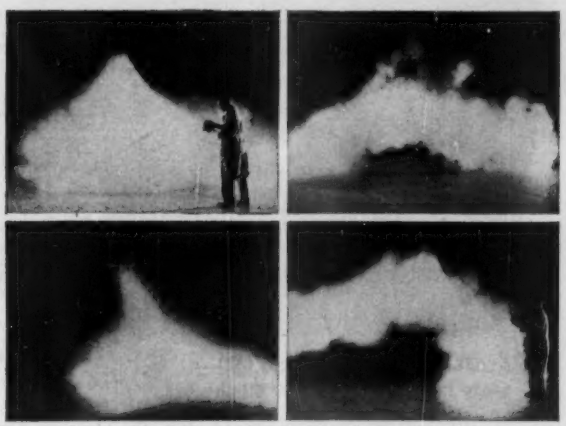
Patented diffusers on TRANE unit heaters put heat right where it's needed !

EXCLUSIVE LOUVER CONE DIFFUSER on TRANE Projection Heater concentrates hot air stream for additional throw. Diffuses heat gently, directs it where needed, pinpoints cold spots—all with finger tip control. It taps waste ceiling heat, projects it down to floor line. Ideal for craneways, aisles, bays, hundreds of other places.



Smoke tests show a few of many diffusion patterns of Projection Heater with Louver Cone.

EXCLUSIVE LOUVER FIN DIFFUSER gives new versatility to the TRANE Model H horizontal discharge unit heater. Countless diffusion patterns are now available—divided streams, gentle blanket, spot throw. TRANE also makes the Torridor, a blower unit for large volume heating, deluxe cabinet units and gas fired units. All in a complete range of capacities.



Louver Fin Diffuser adds directional control to horizontal discharge Unit Heater.

TRANE Float Trap (shown), TRANE bucket traps and thermostatic traps are matched to TRANE Unit Heaters to give perfect results for either high or low pressures.

For complete information about how TRANE Unit Heaters and Diffusers can solve your heating problems, see your nearest TRANE sales office or write TRANE at La Crosse, Wisconsin.

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

TRANE

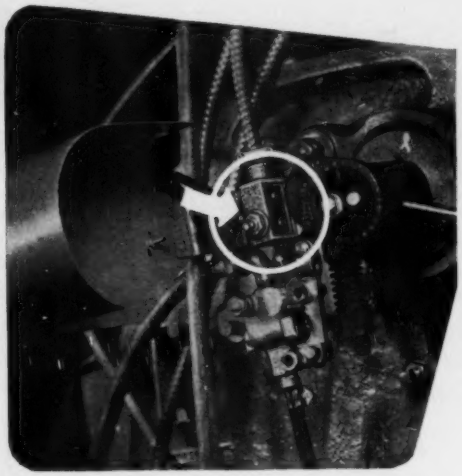
THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

For more facts circle 564 on Reply Card

How plant engineers make present machines safer and more automatic by installing MICRO PRECISION SWITCHES

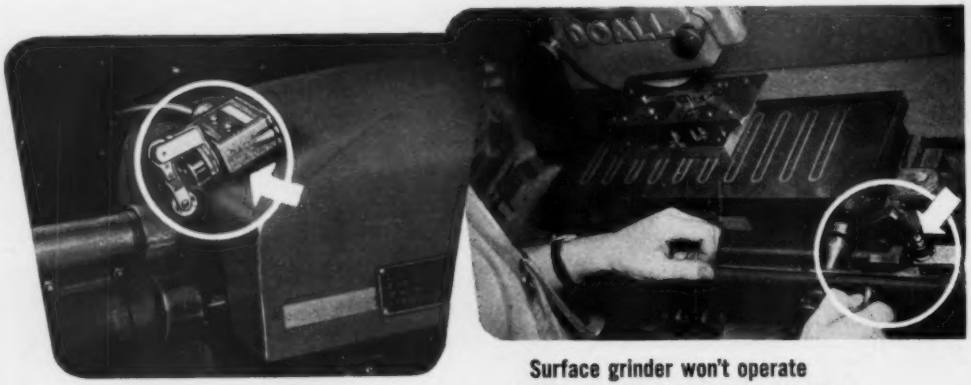
Here are typical installations of MICRO precision switches by plant engineers on present plant equipment to make machines safer, more automatic and more exactly suited to their production needs.

Machines so equipped often pay big dividends in increased production. The MICRO line of precise snap-action switches for economical modernization of existing plant equipment includes a wide variety of ruggedly-housed switches for use as limits, safeties and interlocks.



Prevents punch press from operation unless inching bar is removed

This MICRO die-cast enclosed switch is used to protect the operator of a punch press by preventing the machine from starting when the hinged guard is opened for insertion of the inching bar, used in setting up dies. The switch is wired to the power supply ahead of the on-off switch. When guard is opened, power to machine is automatically cut off.



Keeps screw machine shut off while operator feeds new stock

This MICRO roller-arm-actuated die-cast enclosed switch increases operator safety and prevents damage to a screw machine. The switch is wired into the power circuit ahead of on-off switch. It automatically shuts off the machine when either the bar support tube or spindle cover is moved to an open position.

Surface grinder won't operate unless magnetic chuck is turned on

This MICRO sealed die-cast switch prevents damage to surface grinder or stock and increases safety of operator. Arm installed on the shaft turns on the permanent magnet chuck which holds the stock in place. Driving motors cannot be started unless chuck is turned on.

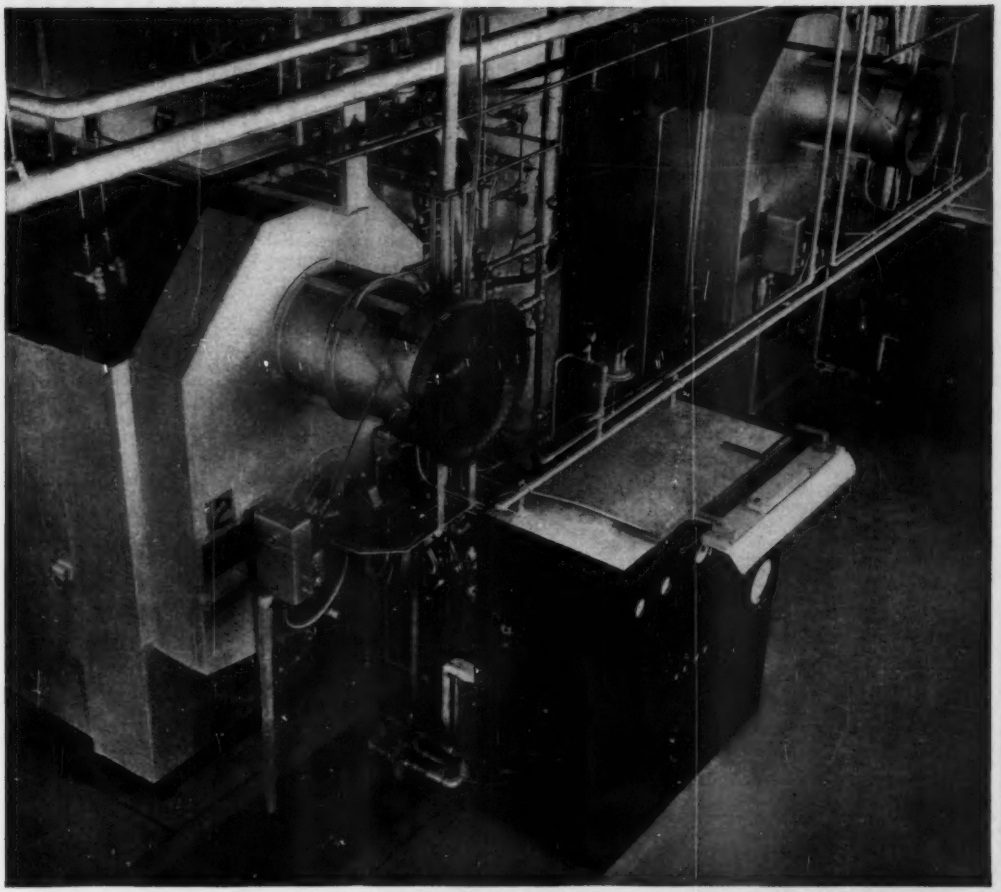
MICRO distributors are located in over a hundred key cities to supply just the right switch to meet your plant application need. Look for your nearest distributor in your classified telephone book under "Switches, Electric."

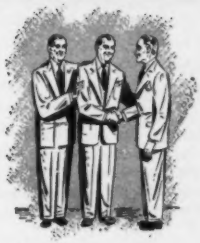
MICRO
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

H HONEYWELL

For more facts circle 565 on Reply Card





Popular Choice

for "Packaged" Steam

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation.

The shop-assembled B&W Integral-Furnace Boiler, Type FM, has gained industry-wide acceptance. Prominent companies in over 50 different industries, along with numerous utilities, educational institutions, hotels, hospitals, housing projects, office buildings, and government agencies have already selected this compact, self-contained steam generating unit for installations in 34 states, three U. S. territories and five foreign countries. Total steam capacity of units now in service and on order exceeds 5½ million pounds per hour. Nearly half of this capacity consists of multiple-unit applications of FM boilers instead of single larger-capacity units.

This recent B&W creation in low-cost steam generation is available in standardized sizes for loads of 2900 to 28,000 lb per hr at steam pressures to 250 psi.

Send for Bulletin G-76 describing and illustrating the many cost-saving features of this popular boiler. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.

BABCOCK & WILCOX

G-573

For more facts circle 566 on Reply Card

NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards on pages 35-36 and 133-134 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—LIQUID RUST INHIBITOR for wet blasting machines

Anarust is described as a material of organic composition containing no chromates. It is soluble in hard or soft water at 20 C and produces a clear, colorless solution said to be odorless, non-irritating to the skin, and not subject to bacterial decomposition. It produces no foaming when put into solution and reduces water staining on ferrous parts which are rinsed with it. Its specific gravity is about 1.0 at 20 C.

When used at the rate of ½ oz per gallon of water it is an effective agent in retarding rusting on cast iron or steel parts which are cleaned and washed after wet blasting, according to company, and it can also be used on parts prior to undergoing plating, enameling and painting. (For more information circle No. 1 on Reader Service Card.) American Wheelabrator & Equipment Corp.

2—NAILER drives them in faster and with less effort

The No. 16 Semi-Automatic Nailer is designed to take most of the work out of nailing. It can be used on any job requiring 6 to 16 penny nails, and because it's nearly impossible to bend a nail with it, the savings in nails alone are said to pay for it.

The nailer consists of only four parts: nail sleeve, plunger, beehive retaining spring and recoil spring. It can be attached to any pneumatic hammer with

a No. 2 Morse taper. The nail is dropped into the barrel of the nailer head-first, placed against the nailing surface and driven when the trigger is pulled. Company says you can drive 20 nails a minute with less fatigue than by hammering. The speed and ease of use possible with this nailer is especially advantageous in overhead nailing. (Descriptive literature on the nailer is offered — to obtain it circle No. 2 on Reader Service Card.) Fox Nailer Corp.

3—RADIO-TELEPHONE for use on industrial trucks

Addition of this unit to company's two-way radio line resulted from demand for radio control of materials handling trucks. The new mobile radio-telephone is available in either 1.5- or 10-w ratings, and features all operating controls mounted directly on the front of the radio cabinet. The loudspeaker is separate, allowing convenient mounting atop radio cabinet, or on the steering column of the vehicle. The antenna is mounted on top of the cabinet. (For further information circle No. 3 on Reader Service Card.) Commercial and Government Equipment Dept., General Electric Co.

4—ADHESIVE for laying flexible tile on grade concrete

Important new applications for rubber, cork and vinyl tile are declared possible with Chem-Set. Described as a waterproof chemically set adhesive, Chem-Set is intended for laying the tile on grade concrete, for installing linoleum and tile on subfloors of steel, terrazzo, ceramic tile and other non-porous surfaces. It is also suggested for providing a tight bond for metal stair nosings and other floor accessories.

Chem-Set incorporates a specially formulated latex and a catalyst vulcanizer to produce both chemical setting action and an effective bond between surfaces. It will not saponify or soften even in the presence of the moisture and alkali which normally occur in a concrete floor, manufacturer points out, although it is not intended to waterproof the surface of the tile. Coverage of Chem-Set is given as 150 to 180 sq ft per unit of powder and liquid paste. (Directions for using it are given in Technical Bulletin IF—circle No. 4 on Reader Service Card.) Pioneer Latex & Chemical Co., Inc.

5—THREE-LAMP CLUSTER is lightweight suspension unit

Designed for use with reflector lamp assemblies as well as conventional luminaires, the Model AL-8700 is a suspension device for supporting three luminaires weighing up to 10 lb each. It is said to be particularly suitable for use in industrial plants, foundries, etc., because it provides for more light without installation of additional outlets.

The AL-8700 features aluminum alloy construction throughout. Three ½-in.

pipe-size tubes support the fixtures. These tubes, threaded at fixture end, are slip-fit and locked by set screws in side hubs spaced 120 deg apart on the junction box. Top hub of the junction box has a ¾-in. female pipe thread connection and locking set screw. When used with company's disconnecting and lowering hanger, the AL-8700 can be lowered to floor level for servicing of luminaires. (Additional details in Catalog 50—circle No. 5 on Reader Service Card.) The Thompson Electric Co.

6—MAGNET ASSORTMENTS for engineers with ideas

Two "you-try-it" kits of permanent magnets are available to let plant engineers devise new uses for permanent magnets within their own plants.

Of the two kits, Shop Package 1, costing $10.00 contains 48 magnets in eight styles having up to 2 lb of "pull" for each unit. Shop Package 2 costs $15.00 and contains 18 larger magnets in four styles, with "pull" from 3 to 12 lb. (For descriptive literature on the kits circle No. 6 on Reader Service Card.) offered. Carboloy Dept., General Electric Co.

7—CHAIN SAW is 5 hp unit and weighs only 29 lb

Claimed to provide exceptional chain saw power per pound, the new Model 2MG boasts several attractive features. It is completely die cast to cut weight to a minimum and has an automatic chain, sprocket and bar oiler to provide constant cutting lubrication. Other fea-

tures include a one-hand rewind starter, finger-tip power control, 360 deg bar indexing, and safety stop button. The engine has an all position float type carburetor, dust and rain proof magneto, company states, and it's designed

HIGHLY RECOMMENDED

for low cost service

CRANE

IRON BODY—WEDGE DISC

Clamp Gate Valves

Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 psi saturated steam, 225 psi cold service.

Low in first cost, as well as in upkeep... and look at their wide utility—

Use Crane Clamp Gate Valves for steam; hot and cold water; crude, fuel, and lubricating oil; air, gas, and gasoline service.

Also in food and chemical process industries for caustic solutions, alkalies, corrosive chemicals, and gases.

You'll find Crane Clamp Gate Valves extra rugged, with a strong reinforced body and husky stem. Their compact design means a better fit for more places... a saving on piping in many cases. And because of the simplified clamp construction, these valves enjoy wide favor where frequent cleanout is essential. The bonnet assembly and wedge disc lift out easily—the body stays in the line. Reassembling is no problem for the bonnet joint always makes up tight and stays tight.

Wide choice of regular patterns, all-iron or brass trimmed. On inside screw all-iron valves, an improved self-draining bonnet prevents entrapment of line fluids in the bonnet—protects the threads, keeps the stem working smoothly. Send for Folder AD 1667 or ask your Crane Representative for full details.

The Complete Crane Line Meets All Your Valve Needs. That's Why
More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more facts circle 567 on Reply Card

NEW PRODUCTS

(Begins on page 110)

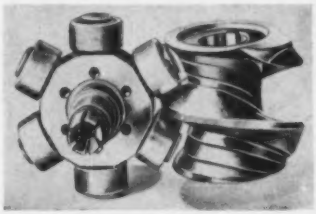
to use all of the combustible energy from the gasoline. (For details on this saw circle No. 7 on Reader Service Card.) Mall Tool Co.

8—FURNACE CHARGER is 4000-lb capacity fork lift

In the new Model A-3481, the lift necessary to pick up and deposit loads is provided through a tilting action of the load carrier which pivots backward a maximum of 10 deg. The chassis is essentially company's rear control stand-up "Yak" fork truck model and incorporates heavy duty drive, controlled caster steering axle and automotive steering and four-speed travel control. The chassis has a gas-electric power source. Standard battery power source recommended is either 30- or 36-v type and 450 amp hour ratings. (For more information on this truck circle No. 8 on Reader Service Card.) The Mercury Mfg. Co.

9—GEAR DRIVE is high speed indexing mechanism

This roller gear drive is described as a new type of highly improved indexing or intermittent motion mechanism. Tests are reported to show that it will operate 8000 hr (four shift-years) without maintenance when extreme precision is required—and up to 20,000 (10 shift-years) when extreme precision is not required. And even after long use the unit can be renewed by replacement of standard ball bearings.



The drive is designed to permit high speed, precision, design versatility and low maintenance on indexing dials, carriers and conveyors.

To take care of either new or existing machinery, the roller gear drives are custom-designed with any number of stops from two to infinity. The indexing period, a separate consideration, may vary from 25 to 100 per cent of the total cycle time and either right or left hand rotation is available. (For Bulletin 101, describing the drive and its many uses, circle No. 9 on Reader Service Card.) Ferguson Machine & Tool Co., Inc.

10—HARDFACING PROCESS for tungsten carbide

A new automatic hardfacing process using this manufacturer's automatic Heliweld Head and a unit for feeding bulk tungsten carbide is announced. Called the Automatic Heliweld Hardfacing Unit, it was developed to meet a need for improved methods in depositing tungsten carbide hardfacing material on tool joints for well drilling rigs. Tests are reported to show that its use for the deposition of tungsten carbide hardfacing material is limited only by the ability to position the work and the arc in the proper relationship to each other.

The manner of deposition of loose

granular pure tungsten particles is said to minimize reduction of particle size by solution of the tungsten carbide into the base metal and to minimize the heat-affected area adjacent to the deposit. In operation, the arc melts the base metal to produce an elongated pool and the tungsten carbide particles are poured into this pool behind the arc. The rate of feed from the hopper is electrically controlled. (For bulletin circle No. 10 on Reader Service Card.) Air Reduction.

11—MOTORIZED SWEEPER cuts sweeping time and costs

A powerful rotary brush sweeper and heavy-duty vacuum cleaner combined into an integral unit, this machine is claimed to be highly efficient on dust, dirt, steel shavings, scrap paper and cardboard, grass, leaves, small metal parts and milling debris. It is suggested for large area industrial cleaning. Sweeping is done by eight sturdy 36-in. hardwood, Palmyra filled brushes welded into a single circular unit of 17 in. dia, 36 in. long. Effective sweeping area is increased to 48 in. by the use of a side brush attachment. The built-in vacuum is mounted directly on the engine shaft. A 1½- to 2-hp Briggs and Stratton air-cooled engine delivers adequate power to pull the

operator on the riding sulky as well as operate the sweeper at a speed up to 4 mph. (Circle No. 11 on Reader Service Card.) Multi-Clean Products, Inc.

12—RESILIENT MAT is resistant to chemical action

Dynel-Mat, multilayer webs of compacted Dynel fibers, is available in rolls in any specified thickness from 1/100 to ¼ in. The high resiliency of Dynel-Mat, plus its resistance to destructive action by chemicals, fungi and insects, is said to make it suitable for lining, cushioning or filtering uses involving severe exposure conditions. Manufacturer says this mat cannot support combustion, and points out that since it is thermoplastic, it can be pressed into higher density sheets, surface formed and shape molded. (For more information about Dynel-Mat and its recommended uses circle No. 12 on Reader Service Card.) The Felters Co.

13—HIGH VACUUM DIODES for high voltage rectifying

Available in two types, the Type 6102 is designed for use in rectifier applications involving peak inverse voltages up to 40 kv. The maximum average current is 150 ma and peak current is 900 ma. It is intended for oil-immersed operation and is 2-13/16 in. long, 2-3/16 in. dia. The Type 6103 is designed for use in rectifier applications involving peak inverse voltage up to 20 kv. Maximum average current is 150 ma and peak current is 900 ma. This tube has an integral radiator for forced-air cooling. It is only 2-15/16 in. long and 2-3/16 in. dia. It weighs 8½ oz. The compact and efficient design of these tubes is said to be of particular value where weight and space savings are of importance. (For data circle No. 13 on Reader Service Card.) Electronic Tube Div Westinghouse Electric Co.

14—STAND-UP FORK TRUCK operates in tight spots

An electric "stand-up" fork truck, the Stoway, is engineered to operate within its own length. It is designed for warehousing and other applications where close quarters and narrow aisles demand high maneuverability and where the driver must continually mount and

dismount. It has a capacity of 2000 lb at 15 in. and 1650 lb at 30 in.

Driver comfort, easy off-and-on access, convenience of controls and good visibility are features claimed for the Stoway. Travel speed is 6.5 mph empty, 6 mph loaded, with four speeds forward or reverse. (Detailed descriptive literature may be had by circling No. 14 on Reader Service Card.) Industrial Truck Div., Clark Equipment Co.

(Continued on page 124)

. . . when you need a Compact Drive

. . . look for the Fairbanks-Morse Seal. On slow-speed applications, for example, you'll find the unique F-M Motorgear that combines reduction gears with the 40%-Shorter Axial Air Gap Motor to make a complete slow-speed unit—*more compact than the average motor alone!*

Whatever the drive problem on your equipment, the Fairbanks-Morse Seal is your assurance of top performance, minimized servicing . . . symmetrical design that improves appearance of the driven unit.

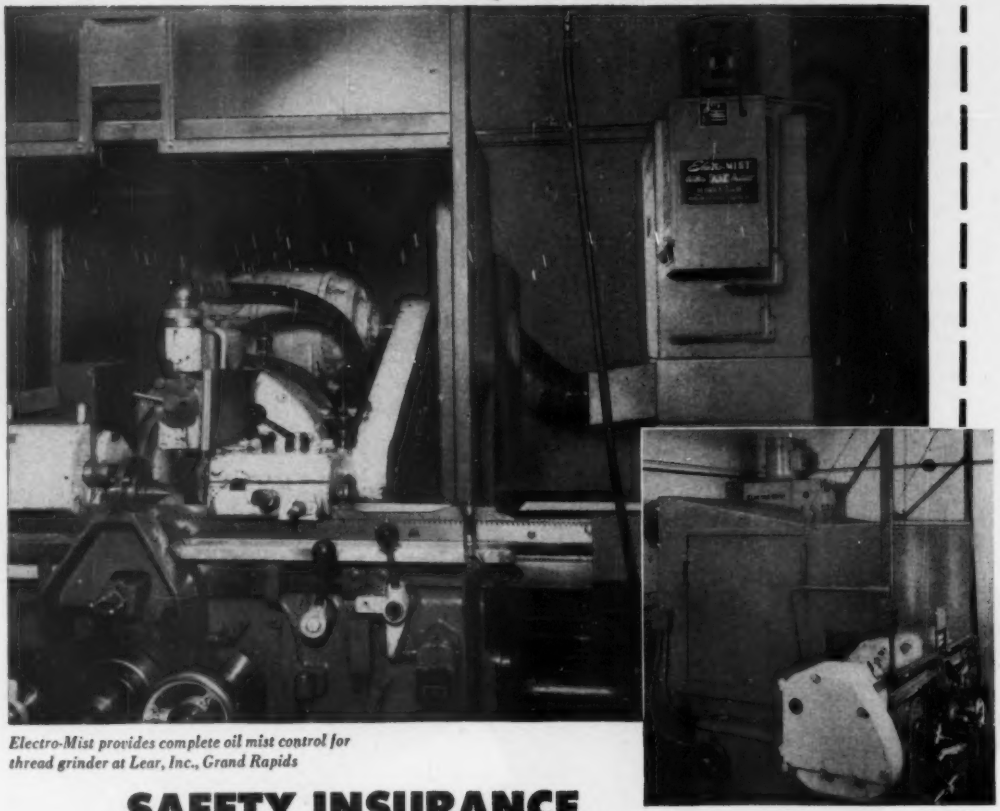
When you look for motors—one or a thousand . . . for standard or unusual applications—*always* look for the Fairbanks-Morse Seal. For over 120 years that seal has stood for the finest in manufacturing integrity to *all* industry. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

ELECTRIC MOTORS AND GENERATORS • DIESEL LOCOMOTIVES AND ENGINES • PUMPS
SCALES • HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

today's best buy is better air!



Electro-Mist provides complete oil mist control for thread grinder at Lear, Inc., Grand Rapids

SAFETY INSURANCE
for high speed cutting and grinding!

Electro-Mist unit collector eliminates oil mist and smoke at the source.

The hazards created by coolants and the nuisance of oil mist and smoke from high speed grinding and cutting operations are completely controlled by AAF's Electro-Mist collector. A self-contained unit designed specifically for this purpose, the Electro-Mist exhausts material at the source by combining heavy duty industrial filters with electronic precipitation. Its unique design allows easy removal of collector plate assemblies, as well as access to all parts . . . without tools . . . thus reducing maintenance to a minimum.

The Electro-Mist also salvages as much as 2 to 5 gallons of coolant daily in its oil reservoir, which may be piped back into the machine or drained off, as desired. The above illustrations show how the plastic front of the hood may be raised for observation or adjustment, or when lowered, provides complete enclosure for the grinding or cutting operation.

If you are interested in safer, cleaner *high speed* grinding and cutting operations call your AAF representative today or write for complete details on Electro-Mist contained in AAF Engineering Bulletin No. 251.

AAF

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky

American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, Cal.

For more facts circle 569 on Reply Card

EASY TO INSTALL AND INSPECT. Interchangeable units; main bus completely accessible; incoming line connections are easily made.

EASY TO WIRE. Four-inch wiring trough; components accessible from all sides; front-connected starters; doors swing more than 90°.

FORD MOTOR COMPANY OFFICIALS INSPECT THE INTERCHANGEABLE UNITS OF THE . . .

New G-E Motor Control Center

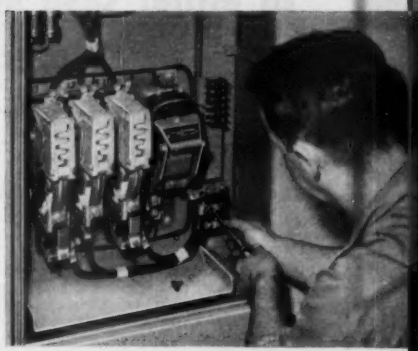
Since January, over 10,000 men from production and management of leading industries (see above) have taken a thorough look at the latest equipment for the centralized control of a-c motors up to 200 hp. Their reports indicate enthusiastic approval of what they saw. Here's why:

VERSATILE. Because units are easily interchangeable without waste space, a variety of arrangements can be made. For example—two Size 1 or 2 starter units require the same space as a Size 1, 2, or 3 reversing starter.

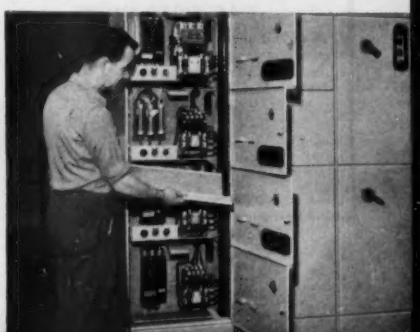
ACCESSIBLE. A four-inch continuous wiring trough provides ample wiring space. Components are mounted on an easy-to-handle frame and accessible from all sides when lifted from cabinet. Starters are front-connected. Master terminal boards can be swung out of compartment for extra working space around conduit.

PROTECTED. Will withstand 25,000 amperes RMS short-circuit current, substantiated by certified Laboratory tests.

For more information on this new G-E motor control center, contact your nearest G-E apparatus sales office or write for Bulletin GEA-4979A today. *General Electric Company, Schenectady 5, N. Y.* 730-42



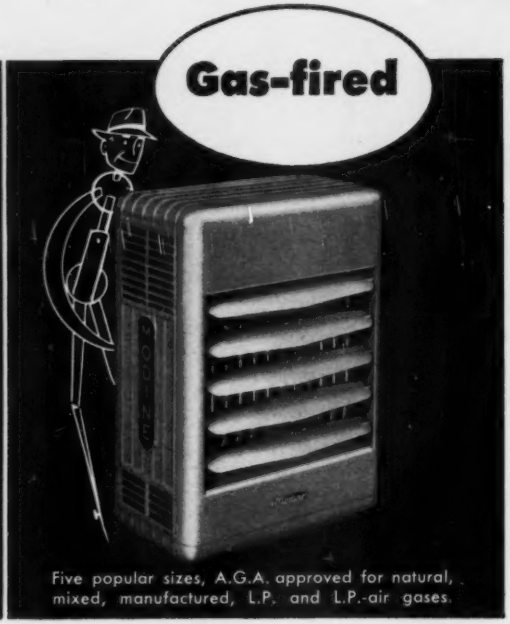
EASY TO SERVICE. Units are easily disconnected from bus and locked in test position (above). Barriers between units are easily removed to facilitate wiring (below).



GENERAL ELECTRIC

Which type of unit heating do you require?

Built in Horizontal (illustrated), Vertical Delivery and Power Throw types — 47 different models.



Five popular sizes, A.G.A. approved for natural, mixed, manufactured, L.P. and L.P.-air gases.

In either case Modine offers you the right unit heater for your exact needs

Modine

STEAM AND HOT WATER UNITS

Special heating coil designs for steam and for hot water assure best performance for each type of system. Discharge air temperatures of 110-120° F are correctly related to air velocity for heating at its best. All-copper coils defy corrosion because fins are bonded to tubes and tubes are brazed to headers. Pre-formed tubes with individual expansion bends absorb stresses, assure long life.

Modine

GAS-FIRED UNITS

Modine is the only gas unit with both *stainless steel* heat exchanger and burner. Lighter weight means easier, less expensive installation, plus faster heat delivery — *within five seconds* after thermostat calls for it. Individually fired tubes provide higher heat transfer. Elongated ports — four times free area of conventional drilled ports — minimize clogging and simplify routine cleaning.

When you ask Modine for a unit heating recommendation, you're sure of an unbiased answer. For Modine builds steam, hot water *and* gas-fired units . . . in a broad range of types and sizes. There's no need for our heating experts to fit your job to a limited line.

Equally important, Modine has been a leader in unit heating for 25 years. Balanced design of all models assures you of perfect heating comfort with maximum fuel economy. For the right unit heater for your requirements, see the Modine representative listed in your classified phone book. Or write Modine Mfg. Co., 1563 DeKoven Ave., Racine, Wis.

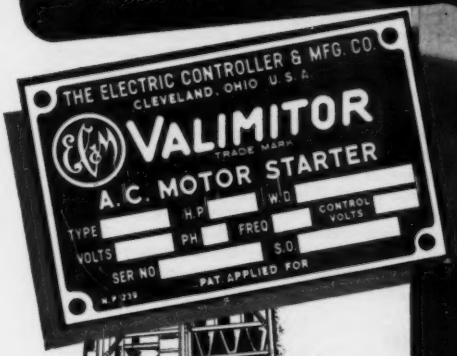
GET THESE FREE BOOKS —Ask for Bulletin 149-A on steam and hot water and Bulletin 652 on gas-fired unit heaters.

U-1191

Modine **UNIT HEATERS**

For more facts circle 571 on Reply Card

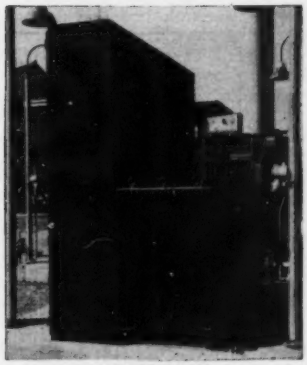
A GOOD BUY for Outdoor Installations



CEMENT MILL
Installation in Eastern Pennsylvania.

Save Housing Costs— Production Space

COMPLETE Overload and Fault Protection in each Starter



OIL REFINERY
Installation in Northwestern Ohio.

EC&M VALIMITOR Starters for 2300-4600 volt motors are built in corrosion-resistant, drip-proof enclosures to supply their own protection against the weather-elements when mounted out-of-doors. Expensive control rooms are not necessary and installation is speeded by the totally-enclosed, completed-wired construction of these EC&M starters.

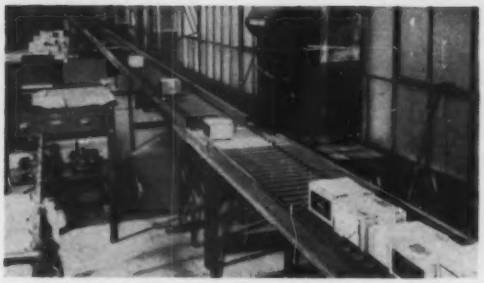
Equally important is the OVERALL protection against overloads and short circuits provided by these EC&M VALIMITOR Starters. EC&M Overload Relays trip instantly on faults and give inverse-time trip on overloads. The high interrupting capacity contactor and VALIMITOR coils clear the circuit quickly and safely. Fuses and spare units for replacement are not required.

Write for T9-117 Reprint Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET ★ CLEVELAND 4, OHIO

For more facts circle 572 on Reply Card

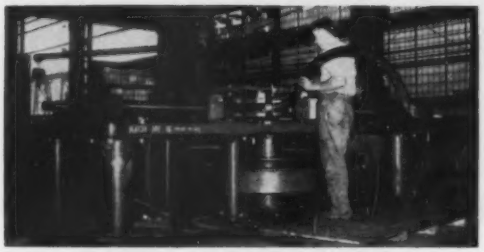
Scale Integrated Into Roller Conveyor Line Eliminates Extra Handling



To avoid extra handling (and attendant extra cost), a roller conveyor can be adapted to perform a weighing operation. The adaptation requires only the insertion of a scale arrangement into a conveyor line leading from production or storage to the shipping areas. Such an installation was recently made in a chewing gum plant by the Lamson Corp., Syracuse, N. Y.

The cartons of gum move down the gravity roller conveyor line and arrive at the roller segment which makes up the scale bed. Here, with no waste motion or detours, they are quickly checked for proper shipping weight. After the weight has been verified, an easy shove by the operator sends the carton on down the line to be loaded for shipment.

Double-End Tube Bender Makes Tough Tube Jobs Easier



Designed, fabricated and installed at the Barberton, Ohio, plant of the Babcock & Wilcox Co., during their recent modernization program, a double-end tube bending machine facilitates tough bending jobs, inherent in the types of equipment fabricated at the plant.

The operator can make bends on either side of the center mandrel, and make reverse bends in a single length of tubing. The chief advantage of the design is that it permits these operations with a minimum of interference from the floor or surrounding equipment. The machine was designed to handle tube-bending work on heavy-duty tubing ranging from 2 in. to 4½ in. in diameter.

Fork Truck Cradle Adapts Trucks for Engine Changes

A 7½-ton fork lift truck has taken the place of overhead hoists at Pan American World Airways, Miami, Florida, and may spark a similar solution for a problem in other plants.

The problem at Pan American was that new type planes were larger, and engines heavier. The hangar structure could not support the 4-ton hoists required to lift the engines from their plane mounts.

The fork lift truck, equipped with a specially-built cradle for receiving the engine, reduces the change time. Adjustment of the cradle can be made in four directions so that line-up of the engines and mounts is done quickly. The cradle also serves as a stand for engines waiting for transportation to the overhaul base.

This method of handling huge engines has proved so effective that the same type adapters and trucks are being used at Latin American airports where hangars and hoists are not available.

Metal Framed Storage Rack Largest of Its Kind

Recently installed at Douglas Aircraft's El Segundo, Calif. plant is the largest bar stock rack ever fabricated of Unistrut metal framing. The huge. 2-section rack is 132 ft wide, over 25 ft deep and 14½ ft high. It is designed to support a load capacity of 4700 tons.

The rack has 2376 individual compartments, 9½ in. high by 12 in. wide. The lower tiers are used for steel storage, including bars, rounds and structural members, while aluminum and magnesium extrusions and tubing are stored in the upper tiers.

A catwalk is built along the front of the rack, 7 ft from the floor, to permit access to the upper tiers, and a 6-ft aisle separates the two sections of the rack.

New Plant Construction Features Tunnels for Services

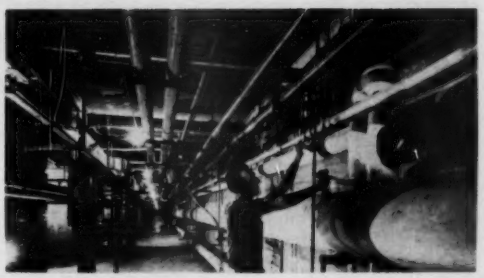
In the new plant of the Lily-Tulip Cup Corp., Springfield, Missouri, economy in construction costs and operating and maintenance expense was built into the structure's foundation.

Below the floor of the building the designer laid out a system of tunnels, 9 ft high and ranging in width from 5 to 12 ft.

Through the tunnels are conveyed all the services—electricity, water, gas, steam, steam condensate, liquid paraffin, etc., that serve the production machines and the building itself.

Carrying the services underground rather than suspending them overhead made possible lighter walls and saved tons of steel.

In reducing operating and maintenance costs, the tunnel system saves money in making all the services readily accessible. This accessibility provides ease of maintenance not found in the usually cramped quarters in a plant where isolated lanes for service lines are not specifically provided.



Liquid Carbon Dioxide Used as Machine Tool Coolant

Carbon dioxide is gaining widespread acceptance as the coolant to use when machining special alloys. This use of carbon dioxide is pictured in use by the Pure Carbonic Co., a division of Air Reduction Co., Inc.

On this lathe, carbon dioxide is being used as a coolant to remove the heat created by the separation of the chip from the stock. Quick removal of heat by this method lengthens the tool life and permits more accurate machining through preventing heat warping of the material. The carbon dioxide quickly vaporizes, leaving no residue. When the tool finally becomes dull it will be resharpened on a grinding wheel using carbon dioxide as a coolant.

The refrigeration effect is obtained by releasing the high pressure carbon dioxide (850 psi at 70 F) to atmospheric pressure through a suitable nozzle. Various nozzles are used to produce desired spray patterns such as cone, fan or pin point. Longer tool life, little or no work hardening, finer finish, less build-up on the tool and higher speeds are all possible with the improved heat removal. For general production, a bulk system is available for piping the sub-cooled liquid under high pressure to a large number of machine stations.

Portable X-Ray Unit Simplifies Non-Destructive Testing

A new midget-type industrial x-ray machine, less than half the size and less than ⅛th the weight of conventional units of equal power, has been developed by General Electric. A light, mobile unit, capable of x-raying steel up to 3½ in. thick, it can be carried around in foundries, welding shops, shipyards or other areas where x-ray inspections are needed to control quality and safety.

The unit is less than 15 in. in diameter, is 44 in. long, and weighs only 150 lb.

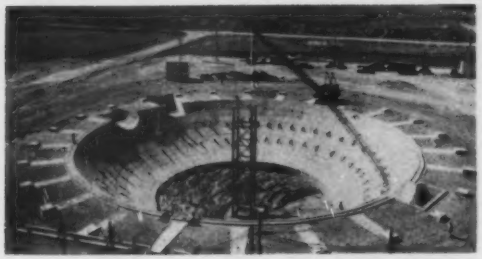
Its first major application has been made in U. S. Navy shipyards, where it is used to inspect critical welded seams and stressed areas in ships during construction.

A feature of the unit's versatility is the protruding snout from which the x-rays are emitted. The snout makes possible the taking of pictures inside large-diameter pipe. The technician can take the unit inside the pipe and make several exposures, without disturbing the pipe itself.

It can be used inside large castings, and is made effective in small castings by inserting the snout into the casting.

Operating at a range from 75,000 to 250,000 v, the unit can be used on anything from magnesium to steel. Use of the machine on light metals is facilitated by the beryllium window in the tube, which allows the passage of softer, less penetrating rays from the tube.

Concrete Foundation Poured for Giant Steel Sphere



A huge concrete saucer, 179 ft in diameter and 42 ft deep, has been constructed as the foundation for a 225-ft steel sphere, largest ever built. It will house a nuclear submarine power plant being built by the Atomic Energy Commission for the Navy. The project is under the direction of the Knolls Atomic Power Laboratory, operated by the General Electric Co.

The sphere, the outer periphery of which will be 706 ft, will rest on the concrete saucer. A ring of steel columns set on concrete outside the structure and reaching to the middle of the sphere will give further support to the building. Welded steel plates, positioned by a derrick, will make up the skin of the ball.

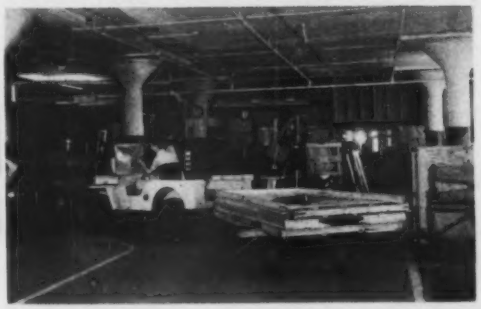
New Instrument Keeps Tabs on Sun to Test Paint

A spectroheliometer specially developed by General Motors Research Laboratories has been set up on the roof of the GM Research building in Detroit for test before going into service in a basic study of paint failures.

Its job is to measure distribution of the sun's energy, the energy's variation with the time of day and the season of the year, and the intensity of the various parts of the sun's spectrum or rays. A special mount keeps the instrument constantly pointing toward the sun.

All data gathered by the spectroheliometer are recorded automatically and the information is correlated with the weathering of automotive paint and finish samples on outdoor exposure racks.

Jeep Comes In Off the Streets to Work as Materials Handler



Going inside to take a novel job, a Jeep is being used as a materials-handling truck on the floor of the Thompson-Winchester Co., Boston.

On an average day the Jeep will push or pull 30 to 40 tons of merchandise and equipment, operating over most of the 80,000 sq ft of floor space. Indoor ramps enable it to run from the basement storage rooms to the second floor sheet metal shop, pulling a trailer loaded with 3 or 4 tons of stock.

The problem of keeping the Jeep's battery charged at the 3 mph speed limit has been solved by installing a high-ratio generator gear.

In addition to its use as a trailer tractor, full advantage is taken of the rear seat recess, hood and fenders, to carry small items through the plant.

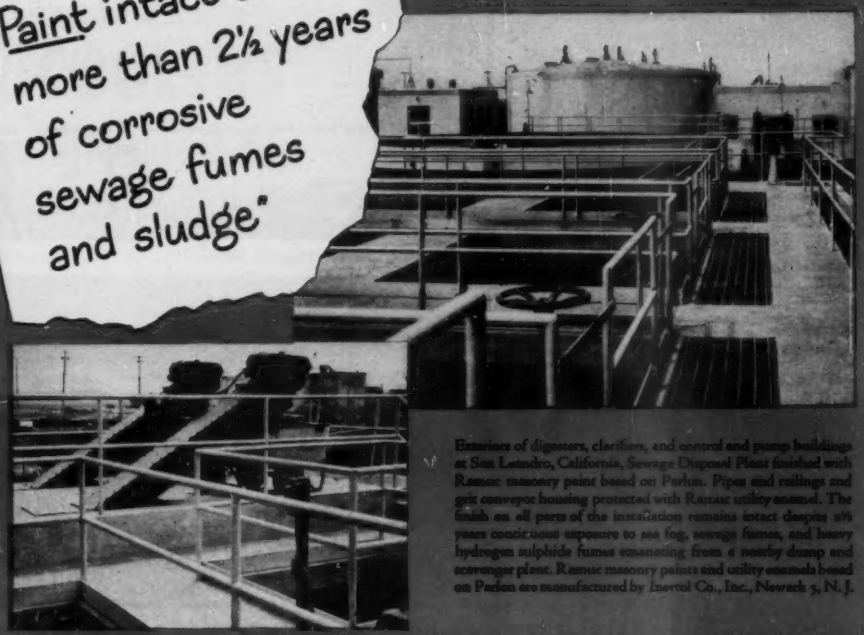
Is This the World's Largest Double Sling Chain?

A mammoth fire-welded double sling chain, with a reach of 35 ft, was recently completed at the McKees Rocks plant of the McKay Co. Designed by the company engineers, it is to be used by the Mesta Machine Co., Pittsburgh, for lifting heavy rolling mill parts.

The total weight of the finished double branch chain is 7,013 lb. The chain links were individually fire welded from a 3-in. diameter wrought iron bar. Each link has inside axis diameters of 4 and 7 in., and weighs 51 lb. The forward steel hooks weigh 500 lb each. The pear shaped main link, which was pounded from a 5-in. diameter steel bar, measures 36 in. by 17 in., inside, and weighs 645 lb.

Parlon Stays On!

"Paint intact after more than 2½ years of corrosive sewage fumes and sludge"



Exteriors of digesters, clarifiers, and control and pump buildings at San Leandro, California, Sewage Disposal Plant finished with Ramuc masonry paint based on Parlon. Pipes and railings and grit conveyor housing protected with Ramuc utility enamel. The finish on all parts of the installation remains intact despite 2½ years continuous exposure to sea fog, sewage fumes, and heavy hydrogen sulphide fumes emanating from a nearby dump and scavenger plant. Ramuc masonry paints and utility enamels based on Parlon are manufactured by Inertol Co., Inc., Newark 5, N. J.

SEWAGE FUMES and sludge... hydrogen sulphide gases... heavy salt sea fog... heat... cold... condensation... day in and day out! How long can exterior paints take this punishment? At California's San Leandro Sewage Disposal Plant, Inertol's Ramuc paint based on Hercules Parlon (chlorinated rubber) continues to protect and beautify masonry and metal after more than 2½ years of severe exposure.

Wherever corrosion is a problem, not only in sewage disposal plants and water works, but in paper and textile mills, metal refineries, breweries —to name a few of the many places where Parlon-based finishes now serve—you can depend on these sturdy protective coatings to check attacks from acids and alkalies, to give better service at lower long-term costs. See your paint supplier for details on Parlon paints, or write:

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AVAILABLE FROM 400 PAINT MANUFACTURERS UNDER THEIR OWN BRAND NAMES

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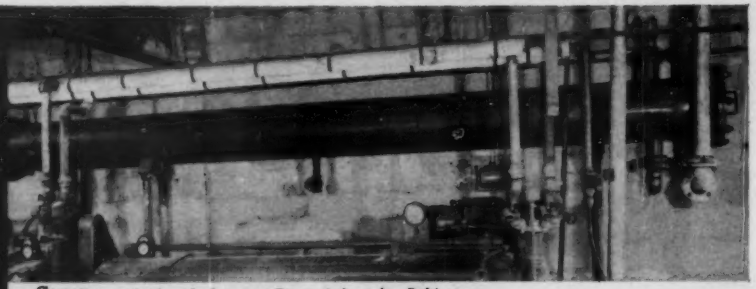
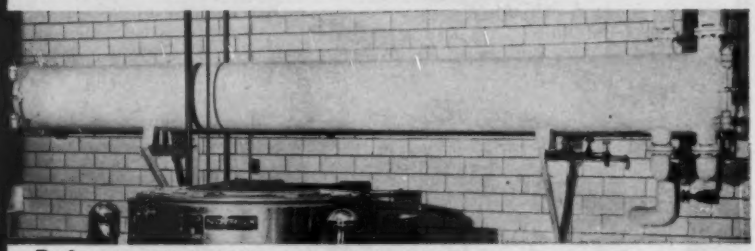
Actually cuts fuel costs

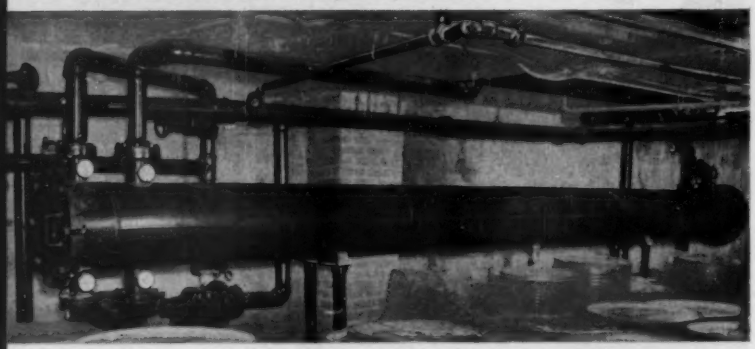
1/3 or more



Saves a third on fuel costs at Domestic Laundry, Baltimore



Reduces boiler load 30% at St. Joseph's Hospital, Elmira



Eliminates an extra boiler at Brown's Laundry, Allentown

How much fuel are you firing down your sewer?

Typical users of Kelley waste water heat reclaimers are saving up to one-third of fuel costs—$4000 per year at United Laundries in Boston for example!

Such important Btu savings are also being made wherever hot water is wasted.

Heating fresh water with waste water heat, saving money on fuel, here's a sure way to cut operating costs. Boiler load is reduced—boiler life extended.

Installation of Kelley hot waste water heat reclaimers is easy enough—because they fit in any otherwise unused out-of-the-way space of sufficient size.

All these advantages are yours with a heat reclaimer system. It will cost you nothing to get full information on p-k heat reclaiming equipment, storage heaters and condensate coolers. Write now for catalog No. 310. Engineering help is yours without cost or obligation. Don't pour dollars down the drain—get the facts NOW!

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MARLEY

The Marley Company

Kansas City 5, Missouri

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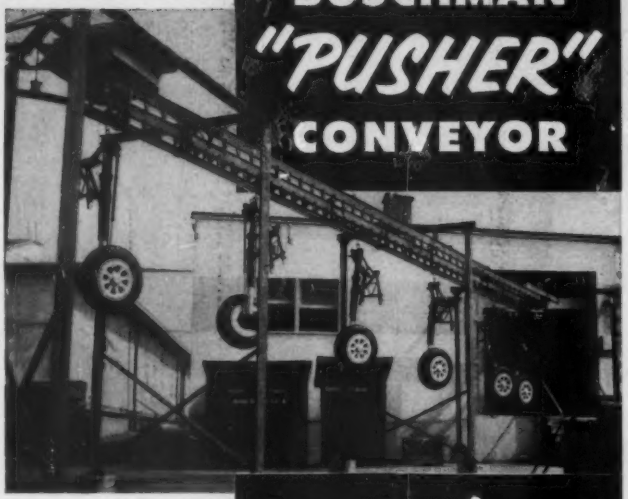
BUSCHMAN "PUSHER" CONVEYOR



gives aircraft parts a lift . . .

Standard monorail trolleys, loaded with 500-lb. aircraft landing gear assemblies, get a boost . . . at Monasco Mfg. Co., Burbank, Calif.

Production got a big lift when a Buschman Cable Conveyor went to work with a gravity-run monorail system in this aircraft sub-assembly plant.

The Buschman Universal Cable Conveyor trolley, with extended pusher bar, automatically "picks up" the ¼-ton load and boosts it to the higher track level in the next building. The offset side-pushing effort of the Buschman cable trolley is balanced by side guide rollers on the load bar. No special arms needed on the monorail trolleys, which, when emptied, are placed on cable conveyor and quickly returned to starting point of the system.

You may find "Universal Cable" the low-cost solution to your handling problem. Check these advantages. It's compact, flexible and most economical in operation. Stock units are quickly obtained, easily installed, changed overnight when desired.

PRODUCE MORE . . . FOR LESS on Buschman Conveyors

SEND US a sketch and details of your requirements, with weights and sizes of loads to be handled.

THE E. W. BUSCHMAN CO.
4426 CLIFTON AVE.
CINCINNATI 32, OHIO
Representatives in Principal Cities

For more facts circle 576 on Reply Card

NEW PRODUCTS

(Begins on page 110)

15—HAND TOOL feeds the steel into punch presses

This magnetic lifter and feeder handles stock and parts in and out of punch presses, and dies. It can be quickly adjusted for pieces of almost any size or shape and the self-aligning magnetic

blocks are designed to overcome irregularities, dirt and chips. The tool is also used for separating stacked sheets and removing slugs from dies. Model 401, a single-magnet type, costs $12.50, Model 412, two-magnet unit, costs $17.50. Tool can be had with any number of magnets required to handle load. (Circle No. 15 on Reader Service Card.) Multifinish Mfg. Co.

16—LOADING DOCK SHELTERS are collapsible canvas

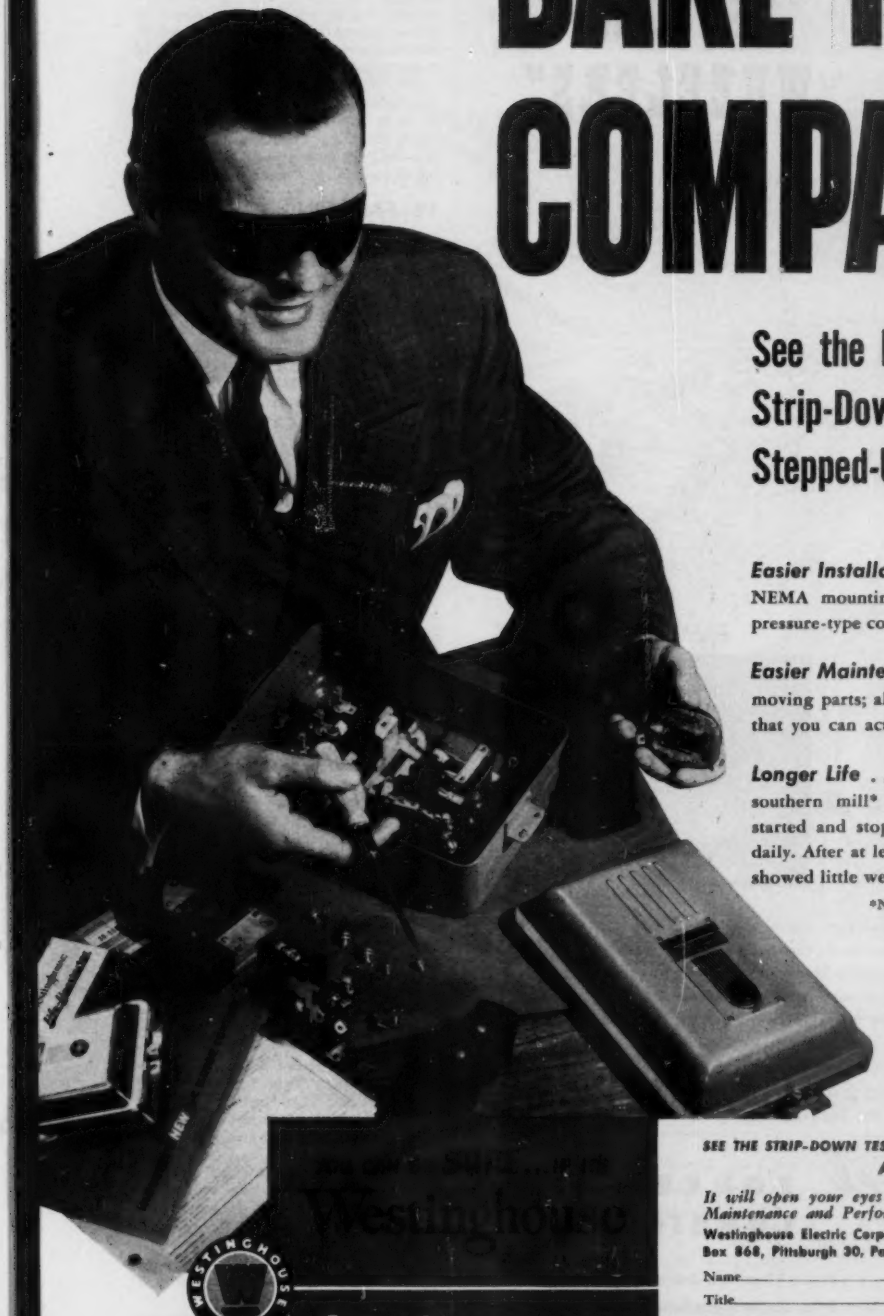
These shelters are made of rugged canvas on a collapsible steel framework. They extend outward to shelter truck or freight car doors, and collapse flush against the building when not in use. Each of several standard sizes can be adapted to fit unusual conditions of use. (For more information about these shelters, circle No. 16 on Reader Service Card.) Atlas Products Co.

The new Reader Service Cards on pages 35-36 and 133-134 are postage-free and easy to use. Just circle the item number of any product you are interested in.

17—PLASTIC PIPE for pressure transmission applications

A new glass fiber-reinforced thermosetting plastic pipe is announced as offering many advantages for use in corrosion service pressure transmission piping. Allowable pressures are higher, resistance to heat and impact loads are greater, and physical properties at extreme temperatures are improved, according to company engineers. Described as resistant to most salts, acids,

DARE TO COMPARE!



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Easier Installation . . . Because of standard NEMA mounting; straight-through wiring; pressure-type connectors; drawn cover.

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Longer Life . . . The chief electrician of a southern mill* says: "Our Life-Linestarters started and stopped the motor 5,700 times daily. After at least a million cycles, contacts showed little wear." J-30098

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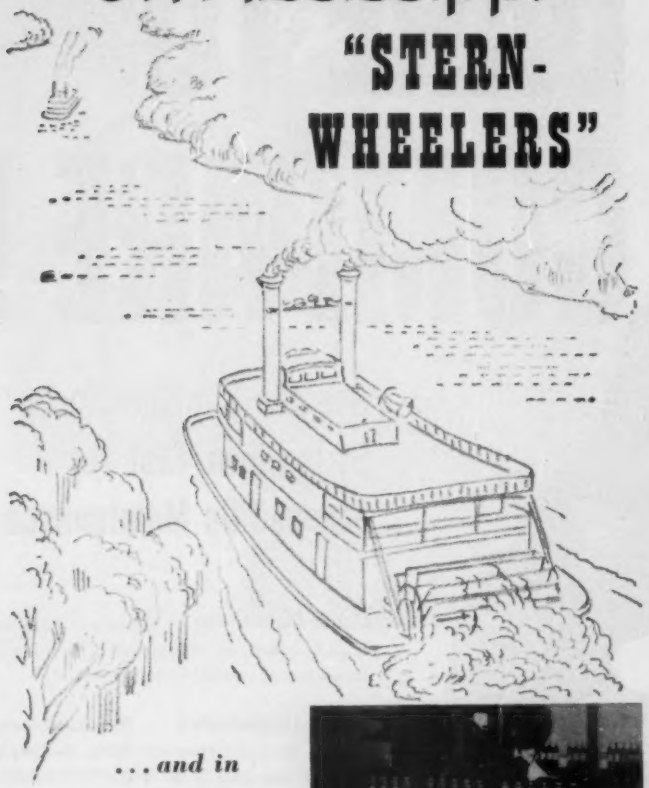

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The picturesque packets that ply the Mississippi . . . like steam or Diesel powered boats on rivers, lakes and seas throughout the world . . . depend on Manzel Force Feed Lubrication for protection of vital wearing parts. Manzel Lubricators automatically supply just enough oil to each point, insuring years of trouble-free service from engines, presses, and other heavy machinery. Insist on Manzel Lubrication in your new equipment — or install it on your old. For further information write Manzel, 301 Babcock Street, Buffalo 10, N. Y.

Manzel FORCE FEED LUBRICATION

A DIVISION OF FRONTIER INDUSTRIES, INC.

For more facts circle 578 on Reply Card

NEW PRODUCTS

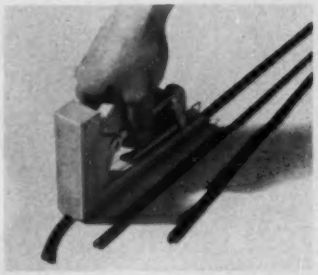
(Begins on page 110)

hydrocarbons and natural corrosive elements commonly found in pipeline applications, the pipe is said to withstand aging or weathering in above or below ground conditions, and its smooth wall surfaces discourage attachment of mineral and biological deposits.

The new lightweight pipe comes in standard sizes of 4, 6, 8 and 10 in. OD, in 20 ft lengths. Working pressure is given as 200 psi. (For design information and suggested uses circle No. 17 on Reader Service Card.) Reflin Co.

18—FASTENING GUN speeds cable, tool installations

Swift, economical installation of cables and hollow tube lines is said to be provided by a new hand-held automatic fastening gun. This compact machine is operated with one hand, leaving the other free to guide the lines being installed. Yet it packs the power of a big industrial stapler, manufacturer says, and its unusual force will drive



bands around cables and tubes into hard or soft woods, plaster walls, flooring, joists and even mortar joints and cinder or mineralite building blocks.

Instead of using ordinary width staples, the gun drives an extra size band with leg lengths varying from 3/16 to ½ in. The fastener is now in use for installation of coaxial cable lines, copper tubing, thermostatic controls, incinerator units, chemical flow controls, many types of heavy wiring. (For information circle No. 15 on Reader Service Card.) The Heller Co.

19—GASKET is designed for better seal, lower cost

Intended for use in a wide range of manufacturing industries where component parts require gaskets, this new type is called a "flowed-in" gasket. It is applied as a liquid synthetic rubber or resin compound, forced through a nozzle onto a spinning component part and then baked to form a solid rubbery gasket which will not fall off the part. The gasket can be applied either automatically or semi-automatically, depending on lining equipment used, and in varying types, thicknesses and diameters.

Chief advantages over pre-cut gas-

ERIEZ MAGNETIC ATTRACTIONS

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ERIEZ MANUFACTURING CO., ERIE, PA., U.S.A. • PRODUCERS OF MAGNETIC SEPARATORS

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uses *ERIEZ* non-electric ATOMagnet Hump Separators in gravity flow lines to remove fine tramp iron from plastic powders used to make records. This avoids damage to dies and needles...eliminates down-time...saves money. The Hump can also be used in pneumatic or liquid flow lines.

SAND HANDLING EQUIPMENT

at National Erie Corp. foundry is protected from dangerous tramp iron by an *ERIEZ* non-electric ATOMagnet Pulley. Made and installed in 4 days, this pulley replaced a burned-out electromagnet...improved performance...kept production rolling.

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This is one of the subjects treated in a new bulletin offered by *ERIEZ* Manufacturing Company. It is complete with descriptions and installation drawings of all *ERIEZ* magnetic equipment for the chemical industry. If you are troubled with tramp iron, this brochure will tell you how to catch it and save money. Mail coupon today.

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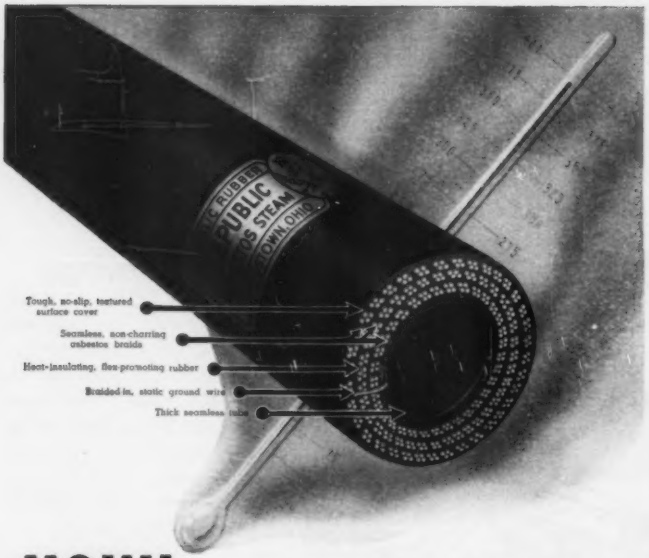

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Extra economy through longer service, easier handling, higher, safer working limits!!! Republic Asbestos Steam Hose is a safer high-pressure carrier, a more versatile and longer lasting low-pressure carrier . . . a **bonus-built** hose for every steam handling requirement! Republic Asbestos Steam Hose is a typical example of how specialized Industrial Rubber Products can save you time and money.

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INDUSTRIAL RUBBER PRODUCTS

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 110)

kets are said to be lower material cost, faster application, better sealing qualities, and decreased material stocking—since one compound will replace more than one type of pre-cut gasket. Specially formulated compounds can be made for sealing against moisture, oils, gasoline, many solvents, heat, pressure, vacuum, weather and vibration. Also compounds can be formulated to produce either cellular or solid gaskets, as well as those which swell to assure hermetic sealing of an enclosed seam. (For details about gaskets and application equipment circle No. 19 on Reader Service Card.) Dewey and Almy Chemical Co.

20—SMALL LIFT TRUCK has package handling device

This 2000-lb electric truck has a clamping attachment for handling of light weight packages in storage areas, on docks and in highway trailers. The hydraulically powered clamp opens to accommodate crates up to 60-in. wide, and it can lift them up to 130 in. in the air for stacking. (Circle No. 20 on Reader Service Card for more details.) Yale & Towne Mfg. Co.

21—GRAVITY CONVEYOR has aluminum frame

Designed to combine lightness and strength this new steel-wheel aluminum conveyor is intended to meet the need for a highly portable conveyor with the durability to stand up under heavy loads. It is made in 45- and 90-deg curves, 5-, 8- and 10-ft lengths and 12- and 18-in. widths, and is available with a wide choice of wheel spacings ranging from 6 to 12 wheels to the foot.

Manufacturer says a 5-ft section 12-in. wide with 8 wheels to the foot weighs only 23 lb, yet will support a half-ton distributed load. Prices are announced as substantially lower than on company's comparable all-aluminum models. (For specifications and information circle No. 21 on Reader Service Card.) The Rapids-Standard Co., Inc.

22—LUMINAIRE has shallow surface for low ceilings

The Type SC Luminaire, only $3\frac{1}{16}$ in. deep, is available in 4-, 6- or 8-ft lengths and two- and four-lamp widths, and can be used with many slimline and standard fluorescent lamps. It may be mounted in rows or individually. Translucent side panels eliminate the sharp contrast between bright luminaires and dark ceilings by emitting some light toward the ceiling. The hinge down louvers provide 35 deg shielding both crosswise and endwise. It uses the new lead-lag ballast.

Ease of installation is provided by a louver which hinges on both sides and by knockouts for off-ceiling mounting. Although designed primarily for low ceiling areas, this luminaire can be

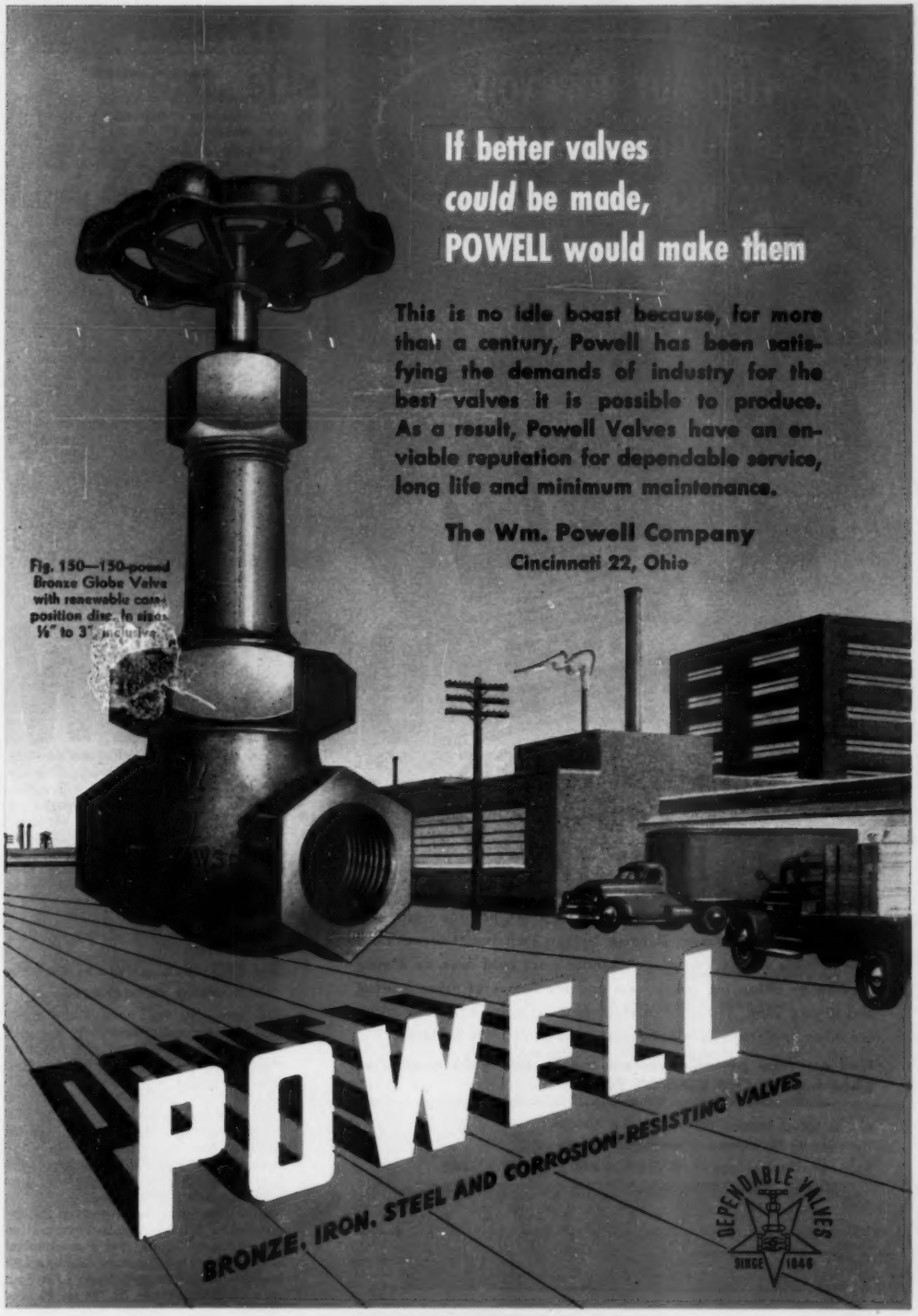
If better valves
could be made,
POWELL would make them
This is no idle boast because, for more than a century, Powell has been satisfying the demands of industry for the best valves it is possible to produce. As a result, Powell Valves have an enviable reputation for dependable service, long life and minimum maintenance.
The Wm. Powell Company
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Fig. 150—150-pound Bronze Globe Valve with renewable composition disc. In sizes ⅛" to 3", inclusive.
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NEW PRODUCTS

(Begins on page 110)

suspended in higher ceiling areas where a shallow suspended system will add to the attractiveness of the room. (For details circle No. 22 on Reader Service Card.) Westinghouse Electric Corp.

23—RATCHET LEVER HOIST is easily used, serviced

The Model R, a coil-chain ratchet-lever hoist, introduces some new convenience and safety features, and retains the ratchet and pawl operating principle used in company's previous models. This type of construction is claimed to eliminate need for a friction brake, since the load is suspended on the ratchet and pawl at all times. Use of coil instead of a roller chain in the new hoist, is said to let the chain swing or wrap easily in any direction.

Special advantages of the Model R are seen in its handle design. The

handle may be operated in any position, to facilitate working in cramped quarters, and it can be operated with either partial or full strokes depending on space limitations and desire of operator. The handle also serves as a "safety valve," because it will bend under overload conditions and thus warn the operator. It is available in 1500- and 3000-lb capacities. (For further information circle No. 23 on Reader Service Card.) Coffing Hoist Co.

24—RETURN UNITS handle heating condensate

This new line of Apco-Matic Condensate Return Units, in both Simplex and Duplex models, is offered in a capacity range suitable for handling condensate for heating systems with ratings from 800 to 10,000 EDR and pressures to 50 psi. The units are said to combine new features in vertical turbine-type pump design with minimum space requirements, quiet operation and completely automatic operation with minimum loss of heat.

Dual discharge openings are incorporated to provide optional connection for piping to boiler, and a mechanical seal is used to eliminate leakage and keep the floor dry and clean. (For data on these units circle No. 24 on Reader Service Card.) Aurora Pump Co.

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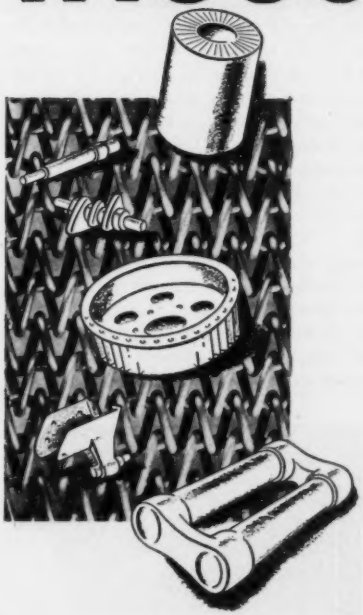

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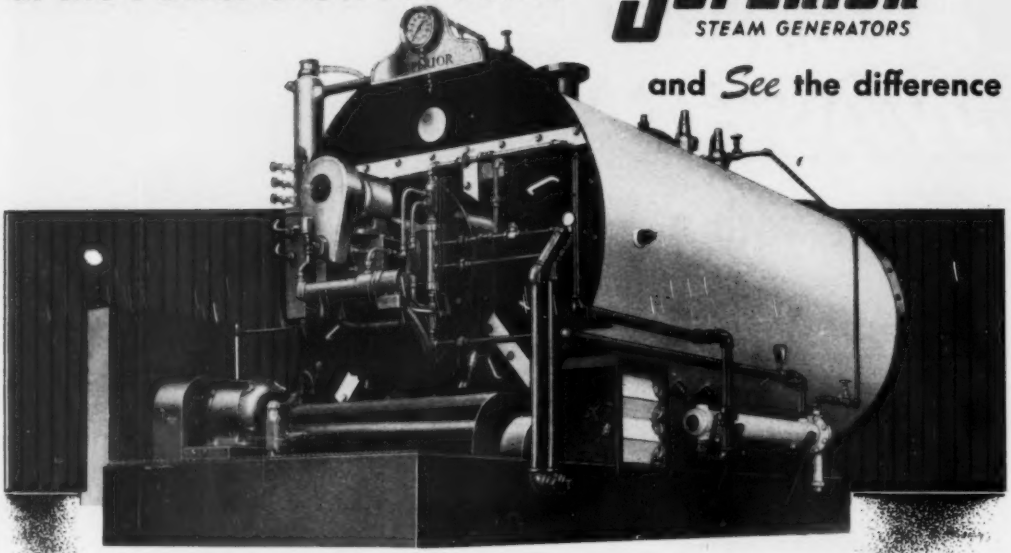

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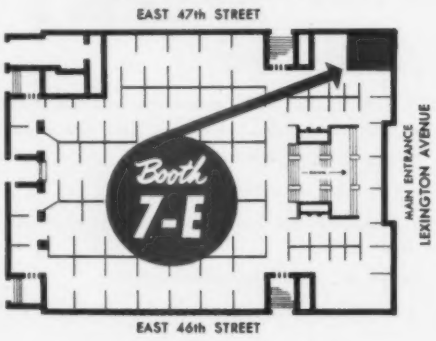

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(Continued from page 36)

power-driven screw conveying material through a tube. Shows construction of this conveyor, pictures several coal-handling installations, lists other bulk materials it can handle. Canton Stoker Corp.

135 Labor-Saving Bridgeplates—How company's lightweight heavy-duty magnesium Dockboards speed loading problems on the shipping dock is told in this folder. Photos showing the bridgeplates in action accompany useful information on construction, cost, time- and labor-saving features. Magnesium Co. of America.

136 How to Catch Man-Hour Thieves—This 16-pp book covers five major causes of heavy man-hour losses and four basic plant handling operations in which such losses are most often sustained. Reasons for loss are presented pictorially as old-style bandits, production phases in which these "thieves" find easy pickings are referred to as scenes of loot, and procedures effective in foiling these thieves are detailed. Towmotor Corp.

Practical Reading on Wire Rope Sling Usage

137 Wire Rope Slings—A wealth of information on wire rope slings, fittings and special assemblies is offered in 90-pp Catalog S-6. Explains registry specification and advantages of company's Dualoc wire rope ending. General specifications of each sling is given along with features, recommended uses. Illustrated with sketches and photos of slings in use. Includes general information, as well as data on wire rope. Wire Rope Sling Dept., American Chain & Cable Co., Inc.

138 Sling Handbook and Riggers Manual—In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are sling fittings. Information on care of slings, data on braided wire fabric, and directions on splicing braided wire sling fabric are included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments and directions for attaching sockets or ferrules. Shows signals for operating overhead cranes. Union Wire Rope Co.

139 Woven Wire Slings—A new type of sling designed to combine strength with safety and flexibility and simplify handling and processing is presented in this 12-pp booklet. Gives data on strength, illustrates standard sling fabrics, includes information on width selection, tables of sizes and weights. The Cambridge Wire Cloth Co.

140 Sling Handbook — Of practical value to users of every type of wire rope sling, this 136-pp booklet shows how to select and specify slings for practically every purpose and how to choose fittings. Slings are pictured and their uses described. Helpful charts and tables included, as well as a section on how to gage, seize and splice wire rope. Rochester Ropes, Inc.

141 Crane Signals Chart—This handy wall chart pictures crane signals and gives suggestions for proper use of slings on one side. On the other side are tables listing strengths and safe loads for eight-part braided slings and single-part slings. Macwhyte Co.

TUBING AND HOSE

142 Versatile Flexible Tubing—A line of flexible tubing in diameters from less than 1 in. to 30 in. is described in 4-pp Catalog C2-3. This ducting, made of fabric supported rubber or plastic wound on helical spring wire coils, is lightweight, retractable, non-collapsible and flexible enough for 180-deg turns. Some of its many industrial uses in ventilation service, fume removal, dust collection and materials handling, as well as in maintenance and original equipment applications are listed. Flexible Tubing Corp.

143 Hose and Tubing—Catalog CC-499 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

INSTRUMENTS, CONTROLS

144 Evenly Graduated Meters—Catalog 2300, 28 pp, presents a new line of evenly graduated flow meters for measurement, recording, indication and integration of fluid flows. The characterized bell for square root extraction and the electronic integrating mechanism are detailed. Models described include the electric meter utilizing an induction bridge system for remote measurements, company's Electronik flow recorder-indicator featuring an electronically powered circuit, and the area type meter. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

145 X-Ray Gage—Catalog MY-52-3, 16-pp, presents a compact and simplified non-contact X-ray gage for continuous or intermittent measurement of strip or sheet stock while in motion or stationary. Tells how it works, describes equipment, details special features. The Sheffield Corp.

146 Pressure Transmitter—Bulletin 228 describes a pressure transmitter for use with pneumatically operated instruments for measuring pressure of liquids and gases where a positive seal is needed between gaging system and fluid measured. It can be used with practically any fluid. King Engineering Corp.

147 Electronic Indicators, Recorders—Catalog 1520 contains 48 pp of factual information on company's Electronik non-control precision instruments which employ a potentiometer, Wheatstone bridge or other measuring circuit, to measure temperature, pressure flow, pH and many other variables. A handbook for plant engineers' and buyers' use, book gives detailed specifications for each. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

148 Electronic Controller—In addition to giving a brief resume of the Autronic principle, Bulletin A-702, 6 pp, also describes company's Autronic controller. Illustrated with photos, schematic diagram, dimensional drawings. Gives full data on this miniature all-electronic system for controlling pressure, temperature, flow and level. The Swartwout Co.

FANS, VENTILATORS

149 Roof Ventilators—Bulletin DR-3-52 12 pp, describes company's Power-Flow roof ventilators for providing controlled ventilation designed for operation with or without duct systems. Photos show how ventilators are built for easy maintenance. Construction details discussed and dimensions and capacity ratings given. Also described are roof ventilators for exhaust-

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ing abnormally hot air, corrosive or explosive fumes. DeBothezat Fans Div., American Machine & Metals, Inc.

150 **Industrial Fans**—Eleven sizes of new industrial fans and their standard wheels are described in 12-pp Booklet SA-6870, which deals with fans ranging from 670 to 44,000 cfm at pressures to 16-in. mercury. Presents condensed specifications on performance and dimensions; discusses air-handling, material-handling, and long-shavings wheel types and gives applications for each. Sturtevant Div., Westinghouse Electric Corp.

WELDING AND MACHINE SHOP EQUIPMENT

151 **For Efficient Welding**—Form ADC 717-B is a 12-pp booklet describing equipment and supplies used in company's inert-gas-shielded metal arc process. Covers guns for manual operation as well as a head for automatic operation. Wires for use with this equipment also described. Air Reduction Co., Inc.

152 **Universal Nipple Chuck** — This single-sheet bulletin describes a nipple chuck for use with pipe machines, power drives or bench vises. Stresses extreme simplicity of the chuck, pictures its construction and use; includes sizes and prices. Beaver Pipe Tools, Inc.

153 **CO_2 as Machine Tool Coolant**—This booklet is a collection of engineering data sheets and articles covering the use of carbon dioxide as a coolant for cutting, grinding and other metal machining operations. Covers equipment, method. Pure Carbonic Co., Div., Air Reduction Co., Inc.

154 **Continuous Chip Removal**—Bulletin MP-649 presents the Chip-Tote conveyor unit which makes possible a continuous flow of hot, wet or dry chips, turnings and borings from machines in operation, eliminating shut-down for manual scrap removal. Explains how these conveyors are assembled from stock parts to serve most automatic and multiple-spindle machines. May-Fran Engineering, Inc.

OTHER EQUIPMENT

155 **Simplified Radiation Heating**—Convector radiators designed for connection directly into process steam lines and for operation at pressures up to 150 psi are described in this bulletin. Explains how heat emission rate increases with pressure, and stresses high heat output, good drainage, low surface temperature. Shows ceiling, wall installations of these compact units. Shaw-Perkins Mfg. Co.

156 **Nitrogen Atmosphere Generator**—Operating principle application information and features of manufacturers nitrogen atmosphere generator are presented in this bulletin. Includes tables of dimensions and utilities required. Gas Atmospheres, Inc.

157 **Liquid Foils**—Here is a file of data on liquid foils of the metallic-rubber type (aluminum or copper) developed for stopping oxidation and depreciation of asphalt and composition roofing. Properties, advantages, application and coverage discussed. Includes reports of its use in solving industrial and institutional roofing problems. Grems Mfg. Co.

158 **Data on Safety Treads**—Now available to plant engineers is a file folder providing information on practically every type of safety tread application. Contains 28 plates of details on abrasive cast and safe groove treads as well as expansion plates, platforms, curb bars and floor grids. Various tread surfaces are described and shown. In addition to dimensional drawings, typical installation and mechanical specifications. Wooster Products, Inc.

159 **Data on Packings**—Now available to plant engineers is an informative data file on manufacturer's Tannate leather packings, their design and application. Includes a folder offering service hints as well as installation and maintenance procedures for U, V, cup and flange packings for hydraulic and pneumatic equipment. Complete specifications for Tannate packings also included. J. R. Rhoads & Sons.

160 **Compressors, Condenser Units**—Eight-pp Bulletin DB 101-160 describes hermetically-sealed refrigeration compressors and condensing units of 75 to 100 hp capacity. Generously illustrated, gives inside story on company's CL8 compressors and condensing units and their component parts, also lists accessories for condensing units. Gives technical data on two sizes of compressors, also standard electrical characteristics. Sturtevant Div., Westinghouse Electric Corp.

161 **Metal Recovery by Ion Exchange**—This 9-pp technical article covers the recovery of metals from dilute processing solutions containing metals. Tables, charts and other data illustrate some of the forms in which industrially important metals are present in solutions, how they might be economically recovered. The Permutit Co.

162 **Grinding Wheels**—Publication G-618, 24 pp, introduces company's newest product—grinding wheels. Tells of the research back of their development; shows, by photos, how they are made. Includes interesting discussion of grinding chips illustrated by photomicrographs. Cincinnati Milling Products Div., The Cincinnati Milling Machine Co.

163 **Oil Heater** — Bulletin AD-160 describes manufacturer's new Peak-Temp oil booster, stressing quicker heating, lower operating cost, quicker shutdown and additional oil storage space afforded. Also discusses elimination of water and weather problems, extra safety and high efficiency. Rood Machinery Div., Cleaver-Brooks Co.

164 **Industrial Waste Treatment Guide**—Eight-pp Bulletin 4 contains a highly useful table showing different types or combinations of unit treatment processes for more than 50 wastes. Another table shows equipment used in the several unit treatment processes; a third table shows company's equipment available. Includes installation photos and a large flow diagram showing how various treatment processes and equipment may be combined to treat mixed wastes. B-I-P Industries, Inc.

165 **Set Screws**—Dimensional Data and list prices on manufacturer's Setko and Zip-Grip screws are provided in Illustrated Catalog 14, 20 pp. Covers a variety of types of screws. Set Screw & Mfg. Co.

166 **Diesel Attachments**—Published to help plant engineers provide for a well-planned engine installation, 23-pp Form 117 presents a wide selection of attachments for manufacturer's diesel engines. They are pictured and described according to where they are used, what they do. Fully indexed, book starts reader at engine base and concludes with exhaust devices, covering attachments for 12 sizes of industrial and other engines. Caterpillar Tractor Co.

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MAINTENANCE

201 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

202 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

203 What to Do About Sashes—Problems and suggested methods for economical maintenance of steel and wood sash are outlined in "Trouble-Free Sash Maintenance." Subjects covered include importance of making buildings tight and draft-free, comparison of putty and mastic glazing for windows, value of caulking openings between sash and masonry, methods of painting. The Tremco Mfg. Co.

204 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.

205 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

206 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, special features of company's roofing materials. Johns-Manville.

207 Iron Cement Handbook—This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

208 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

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Be sure YOUR name is on that card before you mail it!

209 Power Sweepers—Bulletin S-101 pictures and describes power sweepers for industrial, commercial plants. Comparative operating data are given on each sweeper as a guide to selecting correct model and size. Chart showing savings in man hours and sweeping costs afforded is included. Wilshire Power Sweeper Co.

CONSTRUCTION

210 Technical Manual on Plywood — Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

211 Industrial Steel Windows—Planned to offer comprehensive easy-to-find data, this 24-pp catalog gives descriptions, specifications, sizes, uses and advantages of Fenestra pivoted windows, commercial projected windows, and security windows used separately and in combination, also continuous windows used mainly for top-lighting in monitor and sawtooth roof construction. Detroit Steel Products Co.

212 How to Glaze with Plexiglas—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this plastic sheet and detailed data on installation methods. Plastics Dept., Rohm & Haas Co.

213 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.

214 Flooring Guide—Plant engineers interested in specifying resilient tile flooring will find valuable information in Form 107. Tells what each type of resilient tile is recommended and not recommended for. Specific information is given for asphalt tile, cork tile, rubber and grease-proof tiles. Kentile, Inc.

215 How Hardboards Improve Methods—Twelve-pp Form 5202, on production economies in plant maintenance, materials handling and processing, enumerates applications and specifies types and thicknesses of company's Presdwood for specific purposes. Lists 28 advantages of Presdwood, describes its use in architectural applications, bins, utility boards, cabinetwork, containers, booths and ventilators, work surfaces. Masonite Corp.

TOOLS

216 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

217 Idea Book — Sixty pages of "1001 Shortcuts" for production, construction and maintenance make this hand-tool and hydraulic-tool handbook one of the most useful ever. Large photos and concise descriptions give ideas developed and successfully applied by hundreds of tool users. One of the big values attached to the "Idea Book" comes from the manner in which it stimulates the user to create his own ideas. Typical job photos suggest the general principles of the applications. Blackhawk Mfg. Co.

218 For Faster Fastening — Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.

219 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallising Engineering Co., Inc.

220 Tube Working Handbook — Form 369-A is a 32-pp booklet on tube working tools. A section on modern tube working practices covers handling, cutting, flaring, reaming, refacing or fittings, bending, soldering and other operations. Company's line of tools is described. The Imperial Brass Mfg. Co.

221 Portable Spray Gun—An easily used and inexpensive spray gun pressurized with a CO_2 cartridge is featured in this single sheet bulletin. Sketches show the gun in use for painting, cleaning, other work. Sullivan-Becker Machine Co.

222 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Owatonna Tool Co.

MATERIALS HANDLING

223 For Efficient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.

224 Data on Tramrail Equipment—Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

225 Handbook on Overhead Conveying Systems—Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.

226 For Overhead Handling—This 12-pp illustrated catalog covers motorized and hand operated cranes and monorails engineered for efficient, low-cost handling. Special construction features are detailed; accessory equipment shown. Abell-Howe Co.

227 Conveyor and Elevator Belts—This 28-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.

228 Metal Conveyor Belts—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

229 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

230 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equip-

ment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design, operations. The Jeffrey Mfg. Co.

231 Pneumatic Conveying — Technical information and data on handling bulk materials with company's Airstream conveyors are presented in 24-pp Bulletin 529. Diagrams basic types, charts principal applications. Includes case history studies in various industries. Dracco Corp.

232 Conveyors for All Jobs—Catalog 400, 24 pp, presents application information and design details on a complete line of conveyors. Covers roller, wheel and belt types, elevating equipment, cable and chain trolleys, drag line conveyors, bulk handling equipment and special purpose conveying equipment. The E. W. Buschman Co., Inc.

233 Data on Truck Casters — As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

234 Trucks, Casters, Wheels — Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

235 Handling Case Study—Bulletin 3441 describes hoists and cranes installed for the efficient handling of structural steel shapes on a mass tonnage basis. Shows plant layout and pictures some of the equipment used to handle 125 tons per day. Robbins & Myers, Inc.

236 Shovel and Loader — Described in 12 pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

how NORGREN lubricates an air cylinder with less than 1 cfm of air

Cylinder counterbalances "side head" of car wheel borer made by *Niles Tool Works of the Baldwin-Lima-Hamilton Corp.*

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To obtain dependable oil fog lubrication of air cylinder through ¾" pipe with less than 1 cfm air flow (insufficient to operate any ¾" lubricator).

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Air volume builds up in dead end pipe when air flows to and from cylinder. At momentary pressure drop between cycles, trapped air is expelled with sufficient cfm to start oil flow and lubricate cylinder.

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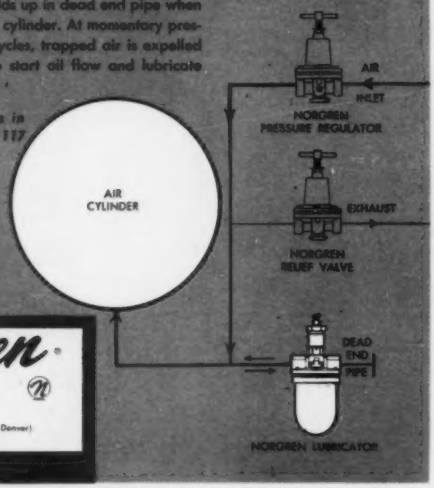

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237 Materials Handling Equipment — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.

238 Industrial Logistics — Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

239 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.

240 Hydraulic Lift Trucks—This catalog provides engineering and ordering information on manufacturer's complete Weld-Bilt line of hydraulic lift trucks in 2500- to 10,000-lb capacities. Also covers skid platforms, pallet lift trucks, two-wheel trucks. West Bend Equipment Corp.

241 Fork Lift Trucks—Bulletin 1570, 8 pp, describes the Diesel or gasoline powered FT series of company's lift trucks available in capacities from 3000 to 7500 lb. Partial assembly pictures point out maintenance and control features, and charts show dimensions. The Buda Co.

242 Hydraulic Lift Trucks—Latest line of hydraulic lift trucks is described in 8-pp Bulletin 525. Trucks are hand-operated pallet trucks, with a package hydraulic unit for raising the truck bed under the load. Features listed include hydraulic lifting and lowering, easy travel and stability. Complete specifications are presented for 2500-, 4000- and 6000-lb capacity models. Barrett-Cravens Co.

243 Portable Bar Racks — This catalog covers company's portable, heavy-duty bar racks for simplified handling and storage of steel shapes, and adapted to use with cranes or trucks. Palmer-Shile Co.

244 Material Flow Equipment — Revised 28-pp Catalog GC-52 presents conveying equipment, including power and gravity conveyors, hand trucks and industrial casters, with photos, drawings and specifications. New heavy-duty conveyor is discussed, and a belt centering device is detailed. The Rapids-Standard Co., Inc.

245 Single Drum Hoist—Sixteen-pp Bulletin 76-X describes single-drum, portable multi-purpose hoists for industrial plants, construction work. Joy Mfg. Co.

246 Trolley Hoists—Bulletin DH-209, 2 pp, describes and pictures ½ to 3 ½ t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

247 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

248 Chain Hoists — Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists described separately. Reading Crane & Hoist Corp.

249 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains funda-

Chain of Fire Protection

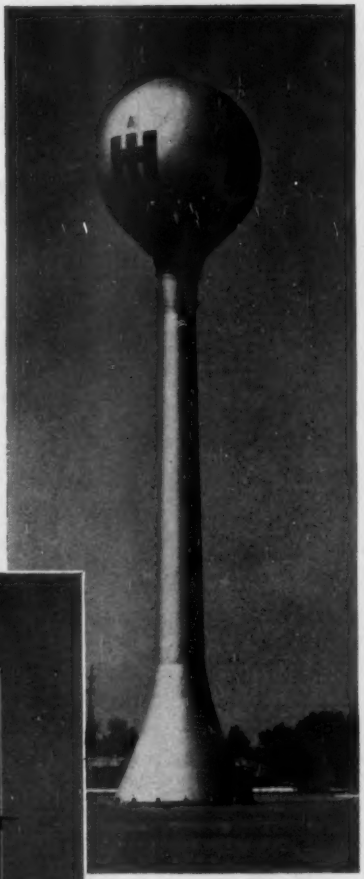
with no Weak Links

A 100,000-gallon Horton Watersphere, a 250,000-gallon Horton suction tank and an automatic sprinkler system assure maximum fire protection at the new International Harvester Depot in Broadview, Illinois.

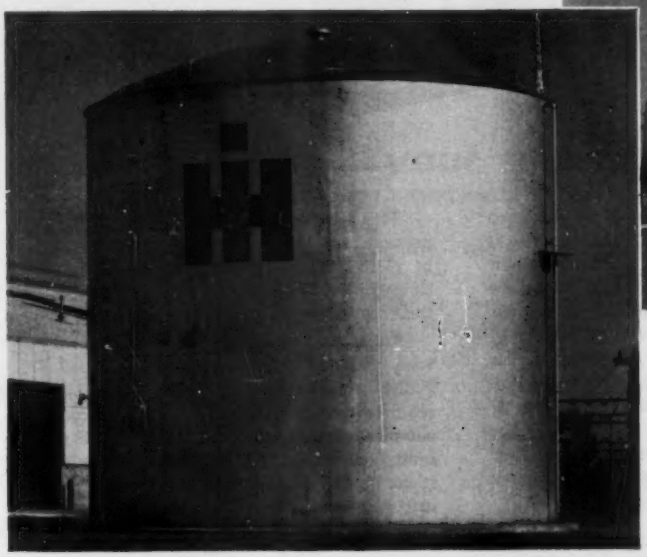
Water from the suction tank is the primary source of supply for the sprinkler system. If a fire should break out anywhere in the 1,138,000 sq. ft. of floor area at the depot, heat from the flames will open the nearest sprinkler head. Water from the sprinkler system will quench the flames before they have a chance to gain headway. Pressure for this operation is supplied by electrically-driven pumps.

If the operation of the pumps should be effected by an interruption in the power supply or mechanical failure, the depot still has a dependable supply of water under gravity pressure in the Horton Watersphere. It will flow into the sprinkler system the instant it is needed.

Horton suction tanks, standpipes, and reservoirs are built in standard capacities up to 10,000,000 gallons. Modern functional Watersphere are built in standard capacities from 25,000 to 250,000 gallons. For more information or quotations, please contact our nearest office.



Above: 100,000-gallon Horton Watersphere used to provide water under gravity pressure for fire protection at the International Harvester Depot in Broadview, Ill.



Left: 250,000-gallon Horton suction tank used as the primary source of water supply for the automatic sprinkler system at the International Harvester Depot, Broadview.

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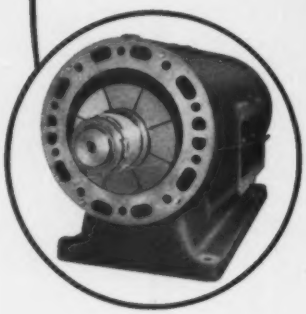
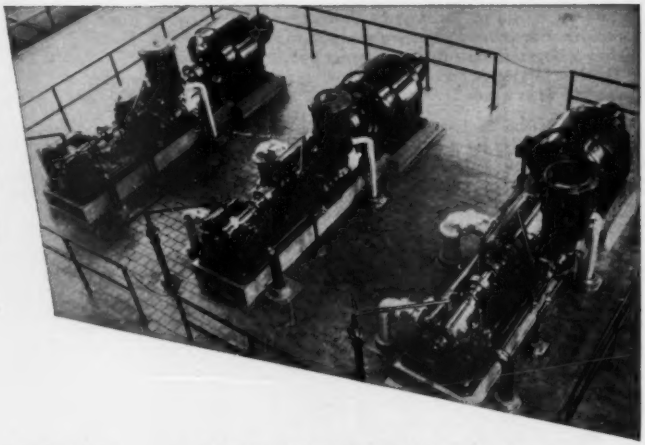
for economical operation





Fuller Rotary Compressors are designed and built to be dependable and economical in operation . . . to give a lifetime of new machine service. They have but few moving parts—rotor, bearings, and blades. That means minimum maintenance and infrequent inspection. Because blades automatically compensate for wear, *full capacity is maintained for the life of the machine.* Every detail in Fuller compressors is engineered for one purpose . . . to give you the best machine money can buy.

Thousands of Fuller Rotary Compressors are maintaining peak efficiency in plants of every size and description throughout the country. They've *earned* their reputation for complete dependability.

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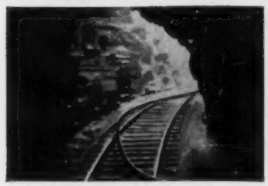
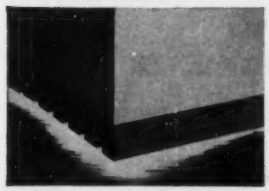
V-BELTS of tough neoprene resist attack from grease and oils.

AIR HOSE with neoprene cover resists sunlight, weathering, aging.

CONVEYOR BELTS of neoprene resist heat, have long service life.



MINE CABLE with neoprene jacket won't propagate flame, resists abrasion, cutting, chipping.



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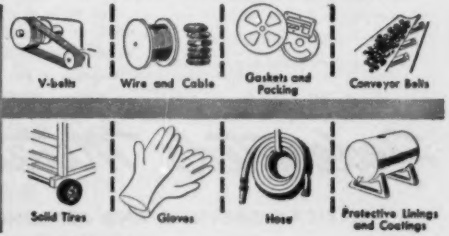

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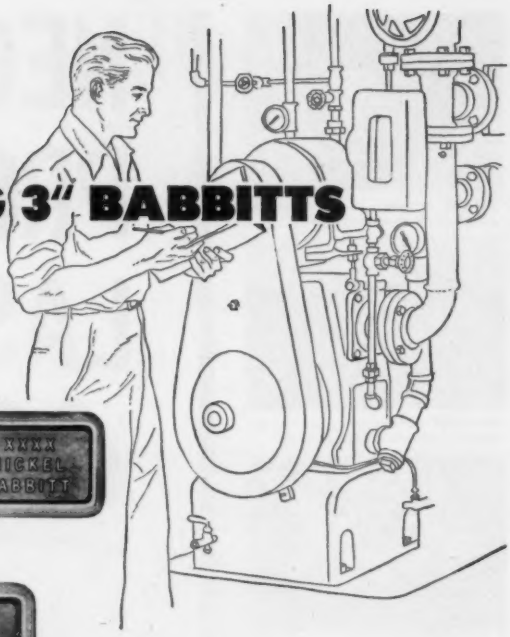
FEDERATED'S "BIG 3" BABBITTS



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mental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

WIRE ROPE

250 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled "Here's How To Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Divs., American Chain & Cable Co., Inc.

251 Wire Rope Handbook—Catalog G-15, 170 pp, is pocket sized and thumb indexed, and one of the handiest available from standpoints of practical information, easy reference and clarity. Provides up-to-date information on a wide range of Preformed and regular type wire ropes, slings and fittings and includes a section of data helpful in selecting the right rope for the job, installing it properly and keeping it in condition to get best use from it. Macwhyte Company.

252 Wire Rope, How to Use It—Practical information on the use and care of wire rope is given in 72-pp pocket-size Catalog C-51. Covers unloading, storing, kinking, unreeling, installing, breaking in, methods of seizing and cutting, measuring, end preparations, many other pertinent factors. Fully illustrated with photos and sketches, treats splicing in detail and includes chapter on lubrication. Also presents data on wire rope constructions, efficiencies of fittings. Available to qualified plant engineers. A. Leschen & Sons Rope Co.

MECHANICAL POWER TRANSMISSION

253 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.

254 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, prices. Boston Woven Hose & Rubber Co.

255 Improved V-Belts—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

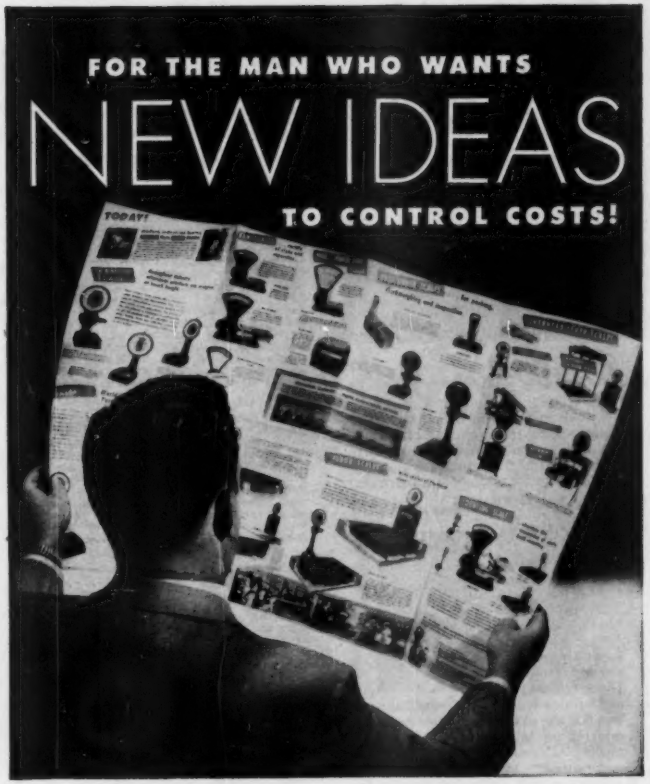
256 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.

257 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

258 Unit Pillow Blocks—Literature is available on this manufacturer's newest pillow block featuring a Fairprene seal which retains lubricant, and set screws for easy installation. SKF Industries, Inc.

259 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliott Co.

260 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.



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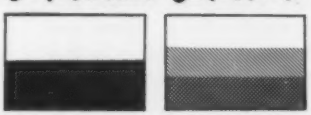

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TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

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261 Oilless Bearings for Conveyors — Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

PUMPS, COMPRESSORS

262 Centrifugal Pump Handbooks—Two instruction booklets covering installation, operation and repair of company's single-stage single-suction and multi-stage centrifugal pumps are available. They include illustrated description of such late developments as Magic-Grip couplings, universal joint couplings with Magic-Grip buanings, mechanical seals. Suggest regular inspection procedures and include pages for maintenance records. Also provide handy reference tables explaining how to locate trouble and listing causes and cures. Bulletin 06X7813, 24 pp, covers single-stage pumps; Bulletin 06X7780 48 pp, covers the multi-stage pumps. State choice or both. Allis-Chalmers Mfg. Co.

263 Rotary Pump Service Manual — Although written for users of company's own rotary pumps and including a parts list, this little 20-pp booklet contains tips on installation and care applicable to practically all pumps of this type. Covers mounting, pipe connections, suction lines, pipe sizes, strainers, discharge lines, power, relief valves, speeds. Provides pointers on noisy operation, rapid wear, decreased capacity, loss of suction. Viking Pump Co.

264 Data on Pumps—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

265 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

266 Air Compressor Selection Data—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

267 Compressor Selection Chart — Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp.

INSTRUMENTS, CONTROLS

269 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

271 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

272 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension ther-

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MUSHROOMS into ATOMIC WASTE

of approximately 95,000 gallons • of water yearly—costing:

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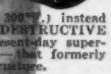

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MANAGEMENT

"Diesel powered Budas have cut fuel costs 50 to 60%, and maintenance is negligible. Under hard use, these new Budas are giving better service than anything we've seen."

MAINTENANCE MEN

"Simplest trucks to service and maintain. Everything—engine, battery, fuel, electrical and hydraulic system—is easy to get at. Making the counterweights and panels removable leaves the whole truck wide open . . . makes maintenance faster, easier."

OPERATORS

"These new Budas are a breeze. I can handle more loads now than ever before. Easier to operate, too. Controls and instruments are placed just right. The guys who built this truck must have been operators."

BUDA

The Line with All 3 for Diversified Handling

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

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For Faster, Easier PALLET MOVING

USE
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PALLET TYPE
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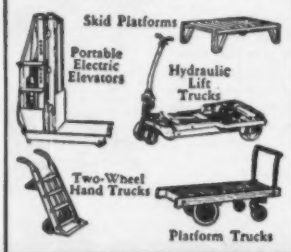
HYDRAULIC LIFT TRUCKS

You'll speed up and simplify pallet-moving of materials — with the "Weld-Bilt" Pallet Truck! It's built to handle a greater variety of single or double-faced pallets easier and faster. Easier on truckers, too.

Check the design and construction of the "Weld-Bilt" and you'll know why. The sturdy forks, with their greased-for-life ball bearing wheels are easier to handle and position under loads of 2,000, 4,000 lbs. and 6,000 lbs. Other features include: Multi-stroke hydraulic lift, accelerator type lowering pedal, "anti-kick-back" safety handle, front wheel equalizer, ball bearing wheels, and many others — all built for longer service, easier operation.

Write For "Weld-Bilt" Pallet Truck Bulletin 1149.



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MATERIALS HANDLING ENGINEERS

304 WATER ST. • WEST BEND, WIS.

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momometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

274 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.

275 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

276 Heating-Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog P-1753-3. Compiled to aid in selection of control equipment to meet rigid specifications. Barber-Colman Co.

MAGNETIC EQUIPMENT

277 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

278 Magnets in Stock—A complete listing of stocked sizes and shapes of Carboloy Alnico permanent magnets is provided in 20-pp Bulletin PM-100. Contains pull curve and size information in tabular form on both cast and sintered types, as well as sizes and application data on holding assemblies, including sheet steel separators, magnetic retrievers and stands. A list of available patterns for various sizes of cast Alnico bars, blocks, rods, rings and sleeves is included, also tables of properties. Carboloy Dept., General Electric Co.

279 Magnetic Pipeline Traps — Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from liquid flow lines and afford protection to processing equipment. Typical trap installation data given. Eries Mfg. Co.

ELECTRICAL

280 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

281 Motor Panorama—Motors and generators—about 50 types in all—are pictured in Publication AEB 100.8B, which serves as a handy reference, since it lists specific literature dealing with each motor shown. Gives general construction details of each unit. Fairbanks, Morse & Co.

You may use the new Reader Service Cards to request information on ads, too. Just circle the key number appearing at bottom of ad.

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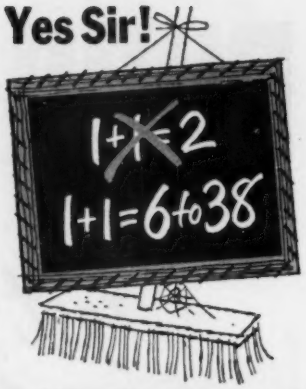

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1 man plus 1 Wilshire Power Sweeper sweeps 6 to 38 times faster than 1 man plus 1 broom. And Wilshire not only sweeps faster... it sweeps cleaner and without dust... inside and outside... wherever a man can handle a broom.

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Remington Rand Methods News

Let's talk control methods at Cleveland Maintenance Show

Many types of effective records for maintenance control can be studied at Booths 507 and 511, Public Auditorium, Jan. 19-22

For profitable new approaches to the record-keeping problems of a maintenance department, there's nothing like seeing how other firms get results. Also, at the Maintenance Show, we will introduce to you a new idea or two in maintenance control — demonstrated for the first time anywhere.

And, naturally, we will show you many of the production and materials control methods described in our manual X-1268. If you can't visit with us in Cleveland, be sure to send coupon below for helpful literature on subjects of interest to you.

Look to your preventive maintenance record for help in keeping plant output at peak

As production equipment grows more complicated, a breakdown becomes more costly. Preventive maintenance control is more vital than ever for plant efficiency. Your records must help *prevent* the failures — or else!

Maintenance superintendents who have a healthy hatred for paperwork always like our simplified visible methods which give maintenance *control* with minimum clerical work.

These methods visually signal the next inspection date for *every* piece of equipment; tell what inspection is needed; permit scheduling of work ahead. Every man's time can be planned for maximum efficiency. Maintenance work loads can be stabilized.

Also, these methods eliminate the guesswork on proper interval between inspections. Decisions can be made on the basis of actual experience for each type of equipment.

Likewise, the records help fix responsibility for an unnecessary breakdown; revealing whether the failure was due to operator abuse or careless maintenance work.

The plant engineer gets all the facts for determining when it will pay to replace a part or machine. He has a complete and convenient history of servicing and repair costs, as well as depreciation on the equipment.

These methods are flexible; can be adapted to your own special needs. See how they have been tied in with preventive maintenance manuals; adapted to special types of equipment such as electric motors; etc.

Study the procedures and methods, as well as preventive maintenance and property records used successfully in many well-known plants. Ask for folders **KD-656** and **KD-705**, also for methods file **MC-727** which is available on a ten-day loan.

Get better maintenance from smaller inventory

There's a firm of 2,000 employees operating on a total maintenance inventory of only $30,000 *which turns over at the rate of nine times a year.* What's more, they don't have to worry about running short of any part or material needed to keep the machines running.

This achievement was made possible by centralizing the inventory records and the purchasing of maintenance supplies under a control system which Remington Rand designed and installed.

Previously, individual department heads had done much of their own buying. This led to wasteful duplication of stocks. Likewise, they passed up the valuable savings of volume buying because each plant bought from its own sources. Nor could they get the service which comes with planned buying.

Previously, an entire department might be shut down for lack of a single part in the stockroom when it was needed. Now the stocks cannot fall below a safe minimum on any item without management knowing about it.

Let us show you how such a system can work for small plants or large — with minimum paperwork. Ask for our new methods file **MC-802.**

QUICK RELIEF FOR COMMON MAINTENANCE HEADACHES

A small part can give you a big pain — when it's the wrong part. Poor description of parts and materials brings all kinds of trouble: shortages and repair delays, duplications and overstocks. But the cure is simple. Identify and classify each item properly, so it can be referred to by exact number at every step from purchasing to costing. See how our engineers have helped other firms accomplish this at minimum cost. Ask for booklet **BSD-10.**

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OTC

TOUGH JOBS! THEY'RE A CINCH WITH THE CENTER HOLE HYDRAULIC PULLER

The OTC Power-Twin Hydraulic Puller saves hours and dollars on every job. Compact, powerful . . . handles 95% of the press work in the average plant . . . can be used as a portable ram . . . speeds up pulling and installing jobs 75% . . . eliminates torque, friction . . . remote control provides safety. Takes the hard work out of pulling jobs.

17½, 30 and 50 TON SIZES

Famous OTC Center Hole Ram permits fast, easy adjustment to the work and interchange from push-puller to sleeve puller to bench press.

A complete range and variety of pullers, adapters and attachments are available to pull or install bearings, gears, pinions, shafts, studs, wheels, pulleys, etc. Works wonders as heavy duty jack, spreader, straightener or compressor.

Amazingly efficient combination of Portable Pedestal Press and 17½ ton Power-Twin Hydraulic Puller. Every shop will find this unit a must...first few jobs pay for it in time, tools and money saved. Move it where you want it . . . it's portable.

Quickly removing multiple drive sheaf with OTC Push-Puller and Power-Twin.

See your jobber for complete information or write us.

OWATONNA TOOL COMPANY
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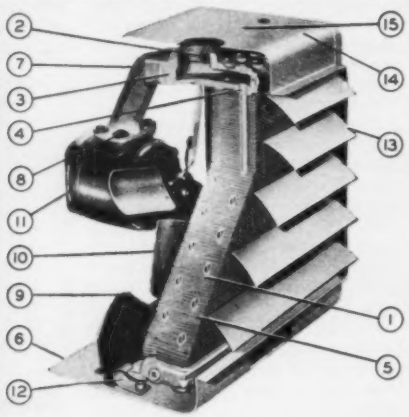
THESE YOUNG FEATURES MEAN GREATER UNIT HEATER EFFICIENCY



Young Type "SH" Unit Heaters are designed to provide a maximum amount of heat for warming "cold spots," as well as for general space heating applications. They are available in 14 sizes for hot water or steam systems up to 150 lbs. pressure.

The salient design features incorporated in the Young Unit Heater are shown above in cutaway view. 1—Heating element gives low final air temperatures. 2—Full size supply and return tappings. 3—Special cast iron used in supply and return headers. 4—Tubes rolled into headers and reinforced with ferrules. 5—Fins are mechanically bonded to tubes. 6—Steel casing insulated from heating element . . . all welded construction. 7—Streamlined motor bracket. 8—Rubber insulated motor mounting. 9—Aerodynamic fan shroud. 10—Fan gives maximum air delivery and operates quietly. 11—Motor designed for Unit Heater operation. 12—Spring mounting permits expansion and contraction of heating element. 13—Sturdy, adjustable louvers. 14—Gray metallic finish. 15—Provision made for hanging unit independent of piping.

"Vertiflow" and Cabinet type models also available. Catalogs sent upon request.

YOUNG RADIATOR COMPANY
General Offices: RACINE, WISCONSIN
Factories at RACINE, WIS., and MATTOON, ILL.

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283 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contactors. synchronous and high voltage starters; d-c control relays, contactors, starters; drum switches, a-c d-c rheostats, speed regulators, etc. Allen-Bradley Co.

284 Motor Handbook — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

285 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

286 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, etc. Westinghouse Electric Corp.

287 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

288 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution systems, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

289 Distribution Duct Engineering Data —Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder, circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating diagrams, layout symbols. BullDog Electric Products Co.

290 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to 5 times retracted length. Koiled Kords, Inc.

291 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

292 Automatic Voltage Regulation—Bulletin 6-351 provides 12-pp of excellent selection data on company's automatic voltage regulators of the instantaneous electronic and electro mechanical types. Explains principles of operation of both types, their special features and applications. The Superior Electric Co.

293 Snap Action Switches—Catalog 82, 24 pp, on precision snap-action switches, presents safety, limit, and interlock types designed especially for switching a-c circuits in industrial applications. Covers heavy-duty limit switches, metal enclosed switches, some of which are sealed against dirt, dust, splashing. Micro, Div., Minneapolis-Honeywell Regulator Co.

294 Overload Relays — Bulletin 1180-3 is a technical data sheet on overload relays designed to combine advantages of thermal and magnetic tripping characteristics for protecting a-c motors. Pictures design details. The Electric Controller & Mfg. Co.

295 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power

Here's *FLEXIBLE* protection in a space-saving design!

Reliable low-voltage circuit protection now comes in smaller, lighter, easier-to-handle units. Note in the picture above how the new Westinghouse DB-50 Breaker (left) is nearly 50 percent smaller than the superseded DA-50. More important, note how the new space-saving design gives you an even greater measure of flexibility.

Every breaker in the complete DB line is equipped with an adjustable overcurrent tripping device which provides—*in a single unit*—combinations of delay and instantaneous characteristics for many applications. And you get this flexibility in every low-voltage application because DB Breakers are available in a space-saving design for 15,000, 25,000 or 50,000-ampere interrupting duty.

The smaller, more flexible DB design is another contribution of Westinghouse engineering augmented by constant High Power Laboratory research.

For additional information, write for Booklets, B-4067 and B-4740, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60789

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

YOU CAN BE SURE...IF IT'S Westinghouse

"DE-ION" CIRCUIT BREAKERS

TYPE DB

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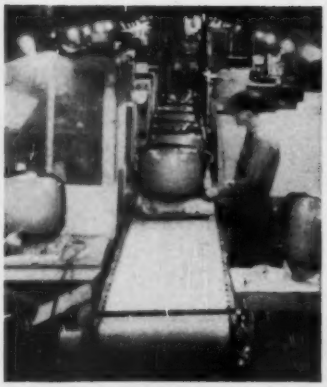
Abrasion is the problem here

. . . Motorola solves it with Imperial Belting

For the belt with the toughest job in the radio-television industry, we nominate this Imperial Standard Rexall Belt in the Motorola, Inc., plant in Chicago. Seventy-pound TV chassis are slid onto this belt from the sides, and removed the same way, at a rate of some 300 per 8-hour shift. To resist this terrific surface abrasion, Motorola chose a 4-ply Standard Rexall (24" wide and 247 feet long). It's one of 11 belt conveyors equipped with Imperial belting in Motorola plants.



Job-Designed Belting

Like all Imperial belting, Standard Rexall is tightly woven from finest heavy-duty silver duck. Plies are double-stitched with inner-locking stitches which positively prevent ply separation. Standard Rexall is ideal for conveying metal parts, castings, metal scrap, heavy boxes, crates, and bags . . . and for conveying and elevating bulk materials such as clay, sand, coal, etc. It has a very low co-efficient of sliding friction.

For new installations or replacements, there's an Imperial Belt that will cut your handling costs. Write for Data Sheet 51-9 and prices.

Imperial
BELTING CO.
1759 S. Kilbourn Ave.
Chicago 23, Illinois

• ENGINEERED BELTING—THE RIGHT BELT FOR EACH JOB •

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storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.

296 Preventive Maintenance Tips—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls given. Westinghouse Electric Corp.

297 Electrical Equipment for Cranes—A complete line of electrical equipment designed exclusively for crane service is presented in 32-pp Bulletin C5-1. Covers everything from company's a-c Magnetorque crane control to current collectors, and is generously illustrated. Overhead Crane Div., Harnischfeger Corp.

LIGHTING

298 Recommended Lighting Systems—This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.

299 Industrial Lighting at Work—Sixteen pp Booklet B-4727 stresses three ways of putting better lighting to work; cutting costs by promoting more production; increasing efficiency by ensuring accuracy, and reducing accidents by exposing dangerous operations. Analyzes mercury vapor and incandescent light sources as to efficiency, service life, maintenance, mounting

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Cleveland

January 19-22, 1953

REMEMBER . . . it's the show for presidents, vice presidents, general managers, plant managers, plant engineers, maintenance engineers – and all other plant operating men whose responsibility it is to select, install, operate, and maintain the plant equipment and services that mean low-cost operation and high production.

AT THE SHOW . . . in one place, at one time, for your first-hand inspection and comparison – *more than 350 exhibitors of the machines, equipment, and services you need to maintain your plant at top operating efficiency.*

AT THE CONFERENCE . . . you'll meet maintenance specialists . . . you'll talk shop, in small group meetings, with men from other plants and other industries who have faced the same problems you face – and have learned how to solve them.

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You can't stop a gusher with a bottle cap

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

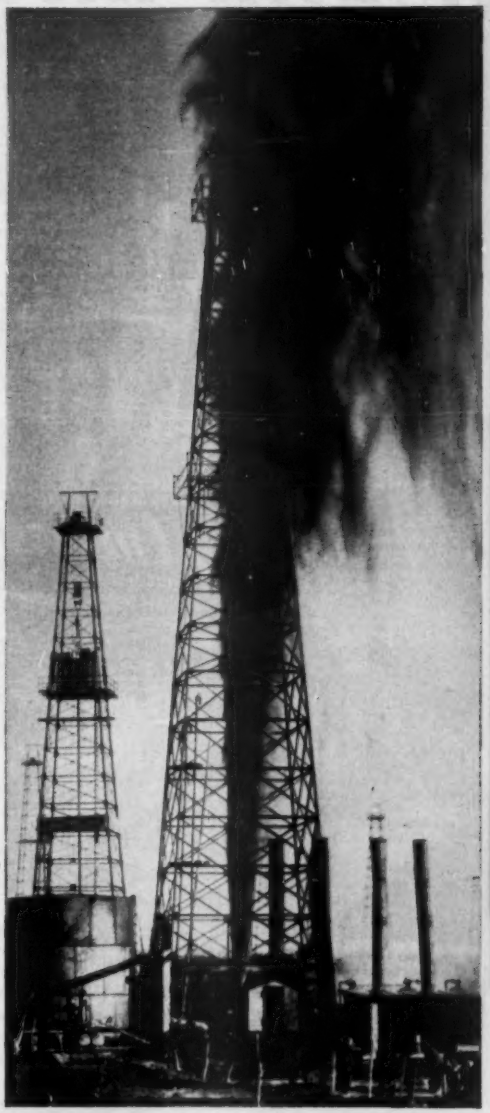
Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a base* of coal-tar pitch that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. And these coatings provide up to 8 times the film thickness of conventional paint coatings.

Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

*Hi-Heat Gray contains a metallic base.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.



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Please send me, without charge or obligation, your booklets on corrosion prevention.

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Portable HEAVY DUTY

P&S BAR RACKS

Any rack easily accessible

for quick convenient safe efficient storage

Item No. C-497

Handling and storage of steel shapes simplified for one-man operation. Using overhead crane for storage in tiers, rack selection is no problem. Design permits bar selection from any rack without disturbing tiers. Built to any capacity and length of stock.

Automatic Tong by HEPPENSTALL, Pittsburgh, Pa., for easy pick-up and safe carrying.

Easily placed on trucks for removal to machines not under crane.

When Ordering Always give "item" number; this will help prevent error. Write for catalog.

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Palmer-Shile Co.

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Another Success Story For Plastic Surfaced Plywood

"No Maintenance"

PLASTIC surfaced Douglas fir plywood forms the working top for this paper inspection table at the Kimberly Mill, Kimberly-Clark Corp., Neenah, Wisconsin. Irv Kersten, assistant paper mill superintendent says: "The smooth, flat surface is clean, wear-resistant—smooth, snag-free. Less expensive than metal, too, and has required no maintenance at all in 3½ years of service. We expect it to last at least ten years."

Plastic surfaced plywood combines the advantages of both plastic and Douglas fir plywood. Get full information about the many industrial and construction uses for this unique panel material. Write Dept. 4712A, Douglas Fir Plywood Assn., Tacoma 2, Wash.

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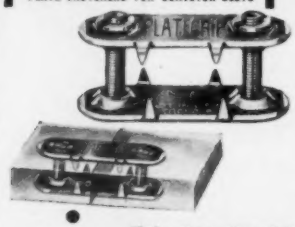
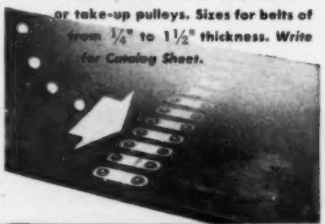
PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



- Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from ¼" to 1½" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.

5398 Northwest Highway, CHICAGO 30, U. S. A.

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height and job suitability. Luminaires of each type are pictured; wattage and lumen output ratings. Westinghouse Electric Co.

300 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

HEATING, COOLIING

301 Heating, Air Conditioning Book—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

302 Heat-on-Wheels for Industry—Illustrated Form 3574, 16 pp, is the story of how manufacturer's portable heaters can solve emergency heating problems. Shows how these heaters provide extra heat for the hard-to-heat spots, and for extra cold areas, to spot heat where needed, and for ventilating, drying and thawing jobs. Herman Nelson Div., American Air Filter Co., Inc.

303 What Unit Heaters Can Do—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation, 8-pp Bulletin 149-A discusses advantages of these heaters and includes performance data. Modine Mfg. Co.

305 Industrial Dry Coolers—Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium-size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

306 Jacket Water Coolers—Illustrated Catalog 1351 describes a line of engine jacket water coolers described as extremely rugged units capable of withstanding abuse of portable equipment installations. Details new design features of the units. Young Radiator Co.

INSULATION

307 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Kaylo Div., Owens-Illinois Glass Co.

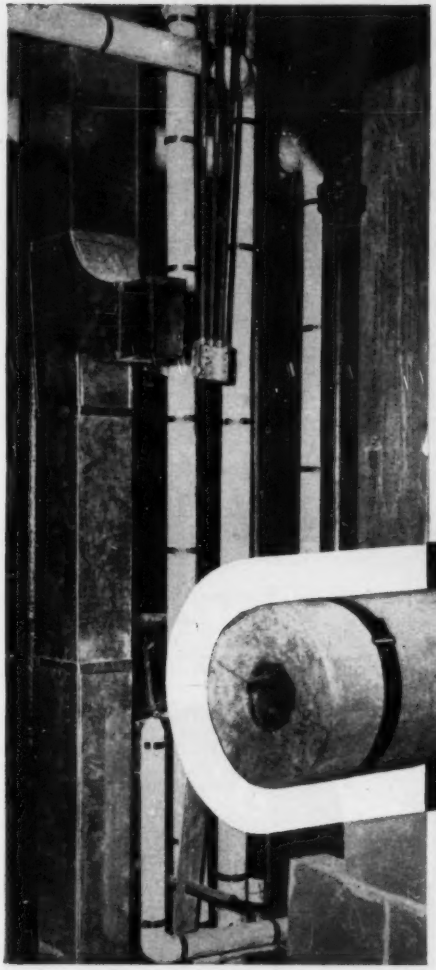
308 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight. Union Asbestos & Rubber Co.

310 One-Coat Insulation—This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from —40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply. Insul-Mastic Corp. of America.

BOILERS, GENERATORS

311 How Much for Steam—Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

312 Oil or Gas Fired Automatic Boilers—Boiler, burner, controls and safety features of 10 to 500 hp oil or gas fired automatic boilers are described in this 4-pp bulletin. Firing rates, dimensions and capacities are given for all models. Boiler Engineering & Supply Co., Inc.



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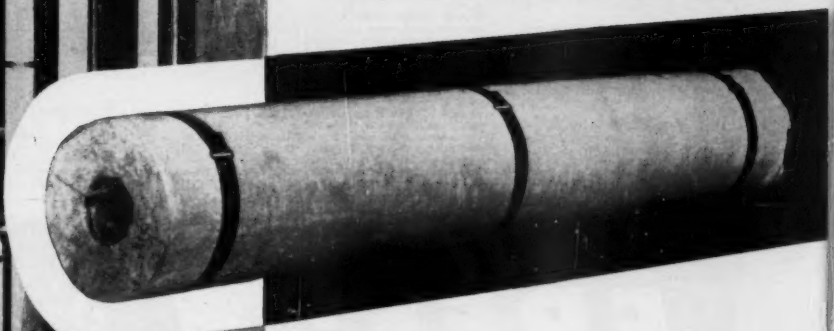

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313 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.

314 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.

315 Shop-Assembled Boiler — Sixteen-pp Bulletin G-76, completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. Capacities, dimensions given. The Babcock & Wilcox Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

316 Efficient Flow Control — Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, common troubles as well as mysterious. Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

317 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co.

318 Small Steel Valves—Illustrated Circular 134 describes a line of small cast steel valves for high pressure service. Tells how valves are built, where to use them. Gives dimensions, weights, prices on both globe and angle types. Walworth Co.

319 Automatic Valves — Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 96-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.

320 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

321 Regulating Valves—Bulletin 313 describes double seated diaphragm regulating valves for use with control instruments, outlining special features of the valves, particularly the "flow line" contoured body designed to provide high capacity at low pressure drop. Leslie Co.

322 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

323 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

324 Steam Trap Book—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

325 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

326 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

327 Steam Trap Selection — Twenty-pp Catalog 600 provides practical selection information on bucket type steam traps, float and thermostatic types, compressed air traps, air eliminators and strainers. Explains how basic design principle of company's Airxpel traps fulfills requirements of a good trap. Wright-Austin Co.

328 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp.

329 Industrial Gaskets — This recently published 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon packing and expansion joints and teflon stock. Includes both engineer-

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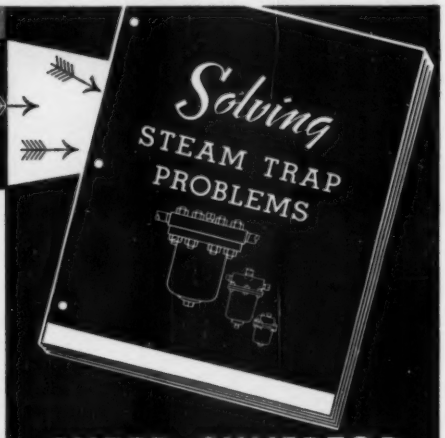

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ing and ordering data, application and installation tips. United States Gasket Co.

330 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

331 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commerical steel pipe. Tube Turns, Inc.

332 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

333 Packless Expansion Joints—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corrugiex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

335 Efficient Dehumidifying—Bulletin 222 is the 32-pp recent edition of company's popular booklet showing how modern dehumidifying equipment solves moisture problems for industry. Illustrated by 70 photos and diagrams of installations, describes many production, handling and storage problems solved by installing manufacturer's Lectrodryers. Covers their use in storage areas, in materials handling, spot drying. Pittsburgh Lectrodryer Corp.

337 Air Filtering Costs—"A Comparative Study of Air Filtering Costs in Central Systems" describes a study made for the purpose of clarifying costs of air filtration, particularly as between cleanable units and replacement-type air filters. Gives data on factors for cost analysis—original equipment, maintenance and over-all cost. Air filters for central system installation are described and pictured. Owens-Corning Fiberglas Corp.

339 Replaceable Air Filters—Form 481 is an illustrated data sheet on replaceable transparent bowl-type filters, ¾ and 1 in. pipe sizes, offering improved filtering action, three interchangeable filtering elements, 1 pt water capacity, easier cleaning. Discusses function, application. Includes dimensions. C. A. Norgren Co.

DUST CONTROL

341 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

342 Wet Method Dust Collection — Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 22-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function operations, settling and dewatering equipment. Claude B. Schneible Co.

343 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

344 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

345 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

VIBRATION CONTROL

346 Engineered Vibration Control—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co., Inc.

347 Simplified Isolation — A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost. The Felters Co.

FUEL OILS, LUBRICANTS

349 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

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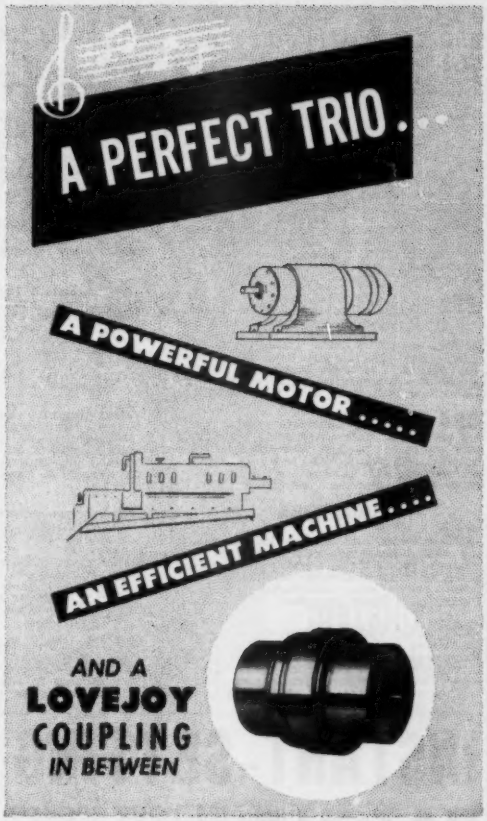

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350 The Why, What and How of Lubricants — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

351 Versatile Industrial Oil — Described in 20-pp Form AD 4078 is an all-purpose oil offering protection for a wide range of industrial equipment, and available in 15 viscosity grades. Discusses six major characteristics of the oil; explains and pictures its use in hydraulic systems, speed reducers, air compressors, electric motors, hydraulic turbines, bearing systems, etc. A chart shows grades and uses, physical properties. Standard Oil Co. (Ind.)

352 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.

354 Force Feed Lubricators—This catalog describes and illustrates force feed lubricators for positive and automatic lubrication of cylinders and bearings. Stresses accessibility of enclosed working parts, other design features. Manzel.

BLOWERS

355 Blowers and Accessories—Engineering and dimensional information on low, medium and high capacity blowers is given in this recently-released 6-pp bulletin. Shows some installations. Blower-Stoker Div., Read Standard Corp.

356 Axial Flow Blowers—In this 6-pp illustrated bulletin are described axial flow blowers of both turbine-driven and motor-driven types. Gives capacity and dimensional data, operating range and specifications on both types. L. J. Wing Mfg. Co.

OTHER EQUIPMENT

357 Hints on Babbitting Practice — In outlying basic steps for the prevention of common bearing failures, Bulletin 146, a little 16-pp booklet, covers everything from the choice of metal for a particular bearing application through the correct pouring practice to in-service maintenance. Proper lubrication, a maintenance schedule, and operation at correct speed and load are discussed. Federated Metals Div., American Smelting and Refining Co.

358 Power Brushes—Bulletin C-369, describing company's new power brushes, pictures their design. The Osborn Mfg. Co.

359 Standard Screw Products—This 10-pp booklet about "Unbrako" standards tells what they are and the advantages of their use. Gives detailed information on socket head, cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts. Standard Pressed Steel Co.

360 Plumbing and Heating Supplies—Here's a 118-pp ordering catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.

361 Where Refuse Is Fuel—Presented in 24-pp Bulletin 505 are installations of company's RotoStokers and RotoGrate stokers for use with medium size and larger units burning refuse fuels separately or in combination with coal. Lists many of the refuse fuels handled successfully by these spreader stokers. More than 20 installations shown. Detroit Stoker Co.

362 Tips on Plant Protection—Instructive information for engineers whose plants are engaged in defense production is furnished in this 16-pp manual. It is intended to solve plant protection problems by instituting security systems for preventing loss of life, damage to property. Training of personnel, planning of hourly routes, safety factors, fire prevention discussed. Detex Watchclock Corp.

363 Elevated Steel Tanks—Welded steel tanks with ellipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure. Chicago Bridge & Iron Co.

364 Neoprene Goes to Work — Eight-pp Bulletin A-18 discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

365 Tough and Flexible—Information is offered on Dynaprene cord, designed for durability and resistance to abrasion and cutting. Tells other advantages of this flexible, flame retardant cord. Whitney Blake Co.

367 Fundamentals of Hydraulics—Technical Buletin B-4 is a 44-pp guidebook covering essential information on hydraulic systems, maintenance, trouble-shooting and selection of proper fluids. Besides offering well-organized reference data for plant engineers, this book is suggested as a training manual for maintenance personnel. It features phantom and cutaway drawings showing functions of basic types of valves, pumps, hydraulic motors, torque converters. Sun Oil Co.

368 Long Wearing Piston Packing—Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

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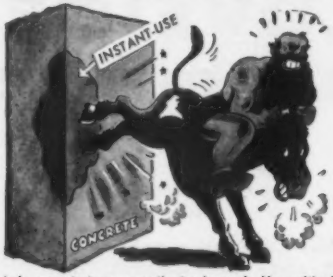

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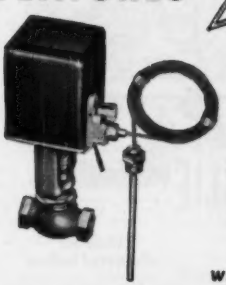

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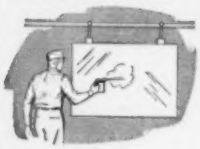

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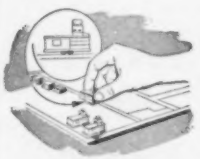

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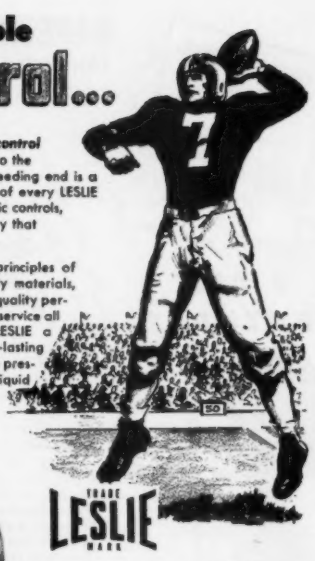

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NEW BOOKS

for the plant engineer

Pipe Flow

FLUID FLOW IN PIPES by Clifford McClain. Size 6 by 9 in.; 123 pp; illustrated; cloth bound. Published by The Industrial Press, 148 Lafayette St., New York 16, N.Y. Price $3.00.

THIS BOOK can be helpful to both the student and the engineer. For a better understanding of the material, a knowledge of elementary algebra is recommended. While advanced mathematics come in handy in comprehending the development of formulas.

The book begins with dimensional analysis and then goes into density and specific weight, gas laws, mean velocity of flow in pipe and other topics to complete the section called dimensions of fluid properties.

A discussion on the viscosity of fluids, its theory, measurement and dimensions follows. Some of the subjects included in this portion are consistent units of absolute viscosity, viscous flow in a capillary tube and numerical values of viscosity.

The section on piping effect on flow presents several charts. One of these is Pigott's pipe friction chart. This shows Reynold's numbers plotted against friction factors.

The last section covers piping design. Here, Bernouilli's theorem is considered with its application. A diagram helps clarify this theorem.

A total of 22 worked-out examples employing various principles appear in different sections of the book.

Thermodynamic Tables and Charts

THERMODYNAMICS. Lefax Data Sheets. Size 4 by 7 in.; stiff paper binding. Published by Lefax, Philadelphia 7, Pa. Price $1.00.

THIS POCKET-SIZE booklet contains loose-leaf data sheets which cover tables and charts on such subjects as: thermodynamic properties of ammonia, liquid ammonia, butadiene; properties of solid and saturated carbon dioxide, superheated carbon dioxide; compressed air; heats of combustion of crude oils, fuel oils, and kerosenes; properties of Dowtherm A, refrigerants, methyl chloride, and many others.

Civil Defense

JORDANS DICTIONARY of Civil Defense. Size 5 by 7¼ in.; 160 pp.; illustrated; paper bound. Published by Philosophical Library Inc., 15 East 40th St., New York 16, N.Y. Price $2.75.

THIS BOOK presents and explains a list of terms that are associated with civil defense in time of war. How-

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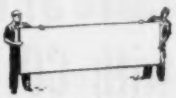

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ever, much of this information can be of use under other emergency conditions.

The nomenclature in this book includes the subject of atomic energy. The coverage of first aid includes a diagram of the human body showing pressure points which can be used to stop arterial bleeding.

Consideration is given to fire fighting and fire control. In the back portion of the book is presented an extensive chart on war gases. This covers their properties, effects and first aid.

Standards for Fasteners

BOLT, NUT AND RIVET STANDARDS. Second edition; size 5¼ by 8½ in.; 247 pp; cloth bound. Published by Industrial Fasteners Institute, 3648 Euclid Avenue, Cleveland 15, Ohio. Price $3.00.

CONTENTS of this revised edition have been increased and include all the current standards for commercial fasteners. The book presents information that is useful not only to manufacturers but also to users of fasteners.

Nomenclature, dimensions, sizes and formulas are given in this publication. Also included are material specifications, manufacturing processes and weights per hundred.

Some of the new standards found in this book are those of the square and hexagon nuts that have been newly unified dimensionally with Great Britain and Canada.

On Technical Reports

WRITING THE TECHNICAL REPORT by J. Raleigh Nelson. Third edition; size 6 by 9 in.; 356 pp, including index; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York. Price $4.50.

SINCE A REPORT is a communication of information, the person preparing the report should convey this information to the reader in best organized manner possible. A technical report should consist of the following parts: title page, synopsis or abstract, table of contents, introduction, body, and appendix. These steps for preparing technical reports are discussed in detail in this book.

The book is divided into four parts. First, design and composition of the report are considered. Next, the text gives specific directions for the setup of both long and short form reports. The third part outlines a systematic procedure for the critical examination of a report. The fourth part presents a 16-week course in report writing which can be used as a basis for classroom purposes or as a guide for study for those in practice who wish to enlarge and clarify their appreciation of the fundamentals of reporting.

Maintenance Organization

(Continued from page 82)

main departments of the maintenance organization, but it is important that these departments be effectively coordinated by receiving orders from a centrally controlled source or much work will be done at cross purposes or not done at all. For this reason a dispatcher and expediter are shown on the chart who are the coordinating forces between the general foreman and the various department heads. The dispatcher takes care of all incoming routine or emergency demands of the plant as well as orders direct from the general foreman, and relays them to the foremen. He also relays information from the foremen back to the general foreman or the expediter. The expediter records the progress of work for the general foreman, contacts various departments at the request of another, reports any work obstacle.

Such a maintenance department as just described can operate efficiently. It not only performs the multitudinous services required in an economical manner, but it can plan to do the work as required, and by planning, it can prevent many would-be breakdown, lost-production-time jobs. This is sometimes called "preventive maintenance."

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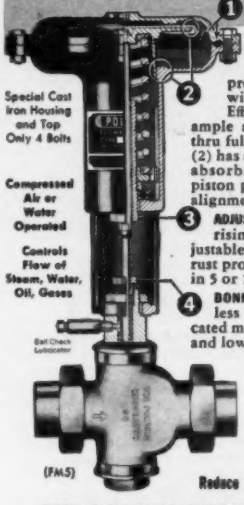
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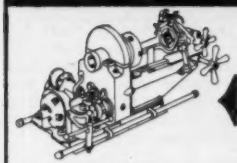

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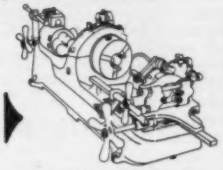

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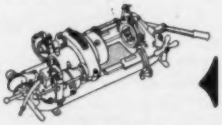

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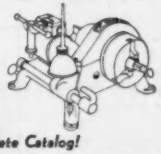

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Maintenance

(Continued from page 87)

Smith declares that now, for the first time, he knows that the various material handlers at distant branches are getting routine check-ups. But more than that, they are getting *proper* maintenance, standardized to Smith's specifications. The curb-side unit is servicing equipment in branches as widely separated as 60 miles.

Smith believes that for plants just now decentralizing, the mobile unit allows the main plant's maintenance shop to keep control of maintenance. He considers this to be highly important, not only from an engineering maintenance viewpoint, but from management's side.

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This is Smith's solution to decentralized plants—his version of maintenance gone nomadic.

Lubrication

(Continued from page 75)

to plain bearings is a most comprehensive one too detailed to adequately cover in a comparatively brief discussion such as this.*

Scoring or Galling: These types of failures may be caused by incorrect lubrication or by extrinsic abrasive contamination. The proper selection of the correct lubricant generally will guarantee against this condition assuming, of course, that bearings are adequately sealed against abrasives which may be admitted from the atmosphere or the machine proper. Sometimes a grease replacing oil will overcome scoring when loads are abnormal. This type failure is not too common in present day machine design.

Seizure: This type difficulty occurs particularly where too small a clearance between journal and bearing is allowed under abnormal heat conditions. It may also occur if the wrong type lubricant is applied or an insufficient supply of lubricant is fed to the bearing. A number of remedies have been made both to relieve the immediate seizure and permanently correct the difficulty. One reasonably authentic paper based upon practical experience in industry offers the following stop-gap measures: "Use graphite, talc, flowers of sulfur, white lead, salt (sodium chloride) in cylinder oil, soap chips." These products may be applied in addition to the oil flowing to the bearing. Such application, of course, is only temporary and it is necessary to eventually correct the basic cause.

The trouble-shooting chart is an attempt to itemize the major difficulties experienced with plain bearings. Reference to it may aid operating personnel to systematically check the causes which have led to ultimate trouble or failure.

---

* Readers who may have a special interest in plain bearing fatigue may refer to the following papers presented before the American Society of Lubrication Engineers at the April, 1952, national convention:

"Tired Bearings—Reasons and Remedies" by Mr. Palsulich, The Cleveland Graphite Bronze Co.

"What Is Bearing Fatigue?"—by A. E. Roach and L. G. Johnson, Research Laboratories Div., General Motors Corp.

"Role of the Lubricant in Bearing Fatigue"—by E. S. Carmichael and R. B. Purdy, Socony Vacuum Oil Co., Inc.

"Material Specifications for Oil Film Bearings"—by E. B. Etchells, Chevrolet Motor Div., General Motors Corp.

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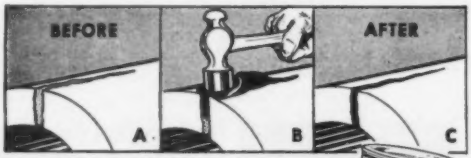

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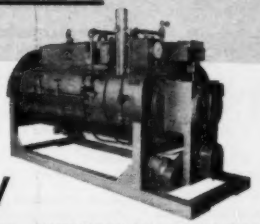

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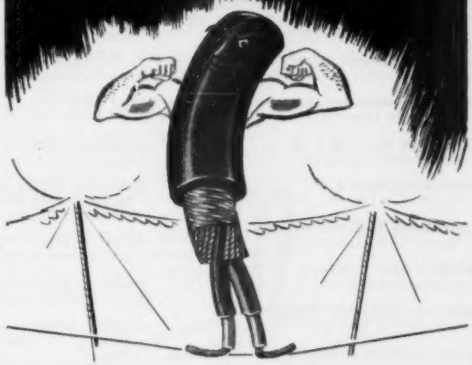

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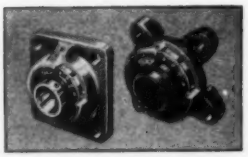

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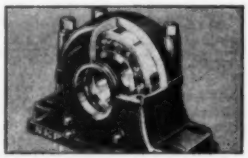

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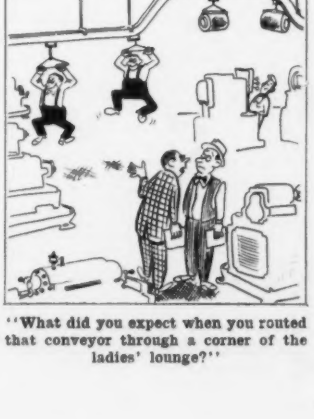

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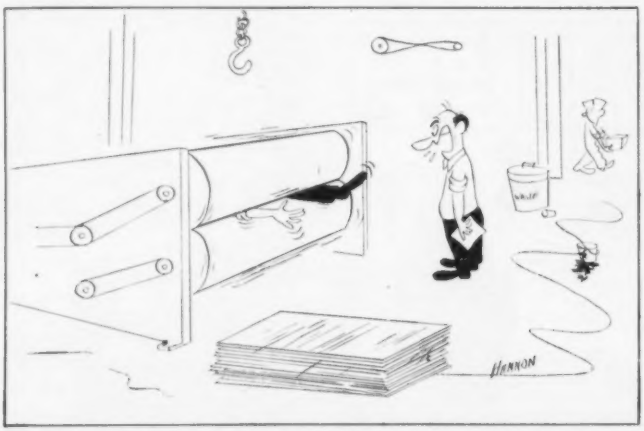

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"I was sent down here to straighten things out"

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Growing with STUDEBAKER

In the photograph above, taken in 1930 in the Studebaker factory, is shown an early type Wing Featherweight Unit Heater.

1930

1952

In the photograph to the left, taken in 1952 in the Studebaker Truck Assembly building, is shown a late model Wing Featherweight Unit Heater.

The Wing Revolving Unit Heater, not only is the ideal method of heating a plant or building, but may also be used in summer (with the steam turned off) for cooling.

CONGRATULATING the Studebaker Corporation on its hundredth anniversary reminds us that L. J. Wing Mfg. Co. has been supplying Studebaker with heating equipment for over a quarter of a century. Since 1926, over 445 Wing Unit Heaters and Heater Sections have been installed in Studebaker plants. And, as Studebaker has pioneered in many notable automotive improvements, so Wing has led the way in many improvements in heating equipment.

Wing

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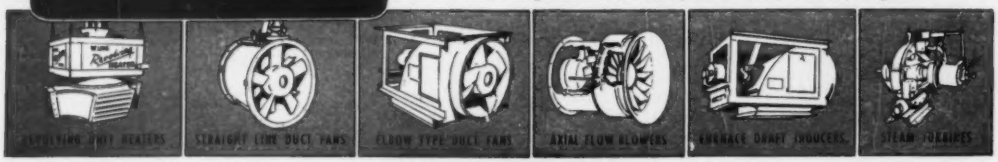
In Europe: Etab. WANSON, Haren-Nord, Brussels, Belgium



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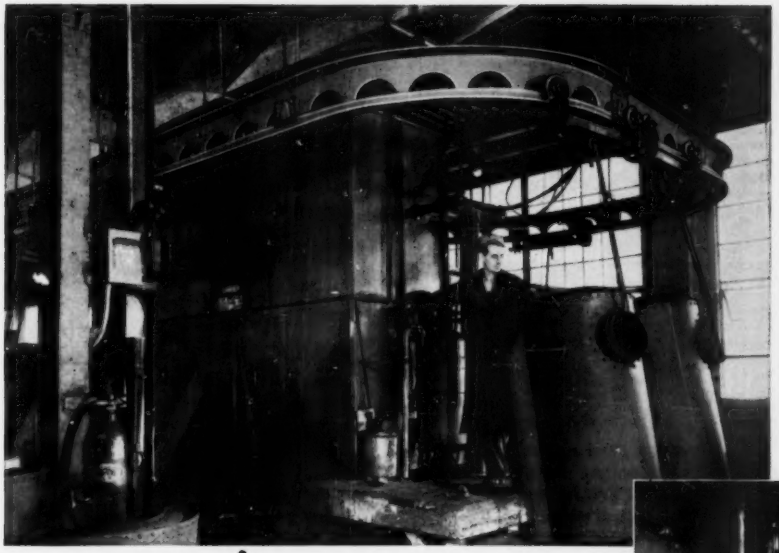

One man transfers furnace bodies, weighing 200 lbs., coming from welding booths to Tramrail track by means of a lift platform. Usually when he advances one carrier to spray booth, all 16 carriers must be moved at same time.

The curved track section is necessary to bring the furnace bodies near the water screen during spray painting so that paint in atmosphere will be removed properly. All points of a body are easily reached when supported overhead and the work is extremely fast.

Easy Push Moves 16 Carriers on Spray Booth Loop

CAN one man push 16 loaded four-wheel carriers (with 64 wheels in all) around an enclosed Tramrail track loop having six left-hand and two right-hand curves?

That question bothered the Armstrong Furnace Co., Columbus, Ohio (subsidiary of Lennox Furnace Co., world's largest furnace manufacturers) when they were developing their paint-spray systems for painting furnace bodies. There was considerable fear that friction and binding of so many carriers would create too great a load for one man to push hundreds of times during a normal working day.

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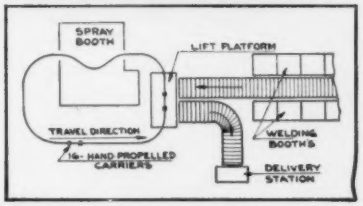

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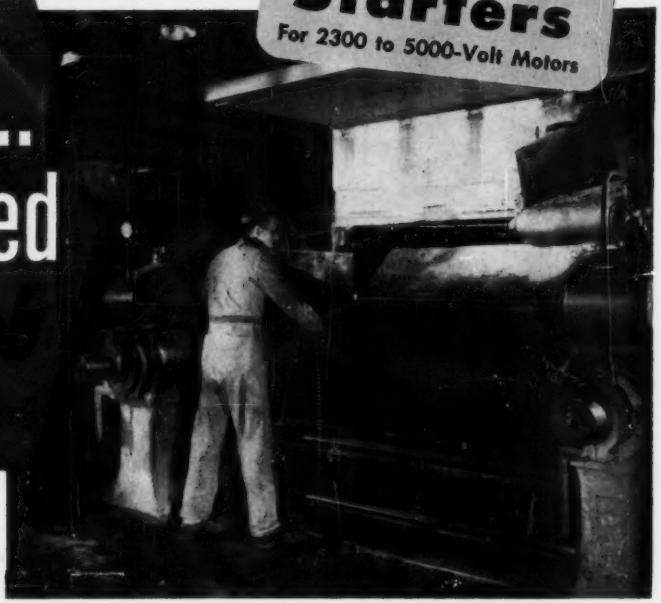

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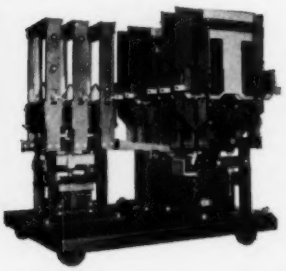

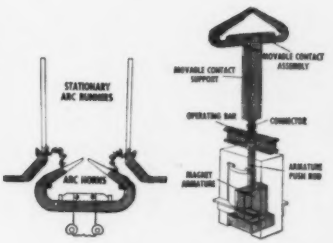

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